



LUND UNIVERSITY

School of Economics and Management

Master's Programme in Economic Growth, Population and Development

Foreign Direct Investment to Encourage Sustainable Development in South America

by

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The seventeen sustainable development goals are the response of the United Nations to make efforts for economic growth, social development, and environmental conservation. International organizations, governments, and the private sector play a fundamental role to achieve the 2030 Agenda of sustainable development. The demand for financial sources brings attention to foreign investment as a source of capital for developing countries. This study aims to investigate if foreign investment effectively influences sustainable development between 2008 to 2019. With data from the World Bank for nine South American countries. This study calculates the economic dimension, social dimension, and environmental dimension to apply three regression models. The results show a positive and significant effect of FDI on the economic and social dimensions. While a negative and nonsignificant effect of FDI on the environmental dimension. The results suggest that FDI is favorable for economic and social development. Although this source of capital lacks to encourage sustainable development in the three dimensions.

Keywords: sustainable development, economic growth, social development, environmental conservation, foreign direct investment, South America.

EKHS42

Master's Thesis (15 credits ECTS)

May 2023

Supervisor: Andrés Palacio

Examiner: Håkan Lobell

Word Count: 16000

Acknowledgements

I want to thank my supervisor, Andrés Palacio, for his constant support and guidance in the research process. I want to thank my parents for their ongoing guidance and support. Lastly, I would like to thank my friends for their unconditional company during the whole thesis writing process.

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1 Introduction

1.1 Background

In 1987 United Nations introduce the concept of sustainable development which considers other features besides economic growth. Sustainable development is the development that meets the needs of the present without compromising the ability of future generations to meet their own needs (Voica et al., 2015). In the 2000s, for the first time, the United Nations established eight Sustainable Development Goals (SDGs) for developing countries at the Millennium Summit (Ki-moon, 2015). Then, in 2015, this organization announced seventeen SDGs, which include economic, social, and environmental dimensions to achieve by 2030 (Fang, 2021). The new SDGs include actions to combat climate crisis and climate change that the previous goals unconsidered. The seventeen SDGs maximize the effectiveness of action in climate change to avoid negative effects in the economic and social dimensions (Fuso Nerini et al., 2019). Thus, these goals represent a call to action to address an agenda that consider synergies and trade-offs between the economic, social and environmental dimensions.

The objective is that governments promote sustainable strategies to improve economic growth, social development, and environmental conditions (Ayamba et al., 2020). Nevertheless, these goals require the coordination of governments, the private sector, and international organizations to boost their achievement of SDGs. Governments must ensure the development of sectorial policies and strategies for sustainable development; on the other hand, the private sector needs to integrate environmental, social, and governance issues in their business and make investments following the principles of sustainable development (Voica et al., 2015). While international organizations contribute through Official Development Assistance (ODA) or blended finance. Definitely financial aid promotes sustainable development in developing countries. However, this financial source has limitations; usually focus in the social issues as malnutrition, limited financial source, broke structure to assign funds, and lack of efficiency to solve sustainable challenges (Lee et al., 2020) (Lopes et al., 2020). Therefore, developing countries cannot only relies on the inflow of financial aid.

Sachs (2012) explains that it is critical to involve the private sector in the process of achieving sustainable development. Similarly, United Nations Conference on Trade and Development (UNCTAD, 2022) argues that the private sector can support sustainable development in developing countries through foreign investments. The transfer of capital from one country into another for the purpose to generate welfare is known as foreign direct investment (FDI) (Afrin, 2004). Developing countries usually manage FDI as a source of financing physical capital deficit to promote economic development (Ayamba et al., 2020). Nevertheless, previous research suggest that FDI is a financial source that can promote or hinder sustainable development in developing countries.

There are several benefits of FDI for developing countries, but it mainly encourages economic growth. Ayamba et al. (2020) remark that FDI promote new production methods, increase economic growth, create new job opportunities, transfer technology, and improve physical and human capital. Additionally, FDI can also bring negatives effects in the host country. For

example labour exploitation, natural resources exploitation, unfair competition, and environmental degradation (Ayamba et al., 2020). However, the effects of FDI may vary from one country to another depending on diverse factors. For instance domestic policies, economic agreements, the strength of domestic companies, human capital, social structures and others (Agosin, 2009, p.23).

In the last decade, the debate is between the costs and benefits of FDI in developing countries, especially for achieving in the field of sustainable development. Despite conflicting opinions of experts, the international community led by the World Bank and International Monetary Fund (IMF) are continuously encouraging foreign investment for developing countries (Afrin, 2004). While the United Nations is more skeptical and suggest that for the achievement of SDGs is necessary successful participation of the host government. When developing countries lack of funding, they require FDI. At the same time, governments, in the host country must ensure policies and strategies to avoid negative outcomes (Fang, 2021). Thus, the challenge for developing countries is to attract foreign investment, meanwhile they assure sustainable development.

For South America a barrier to achieve sustainable development is the fiscal capacity. This region is one of the most heavily indebted in the world (Economic Commission for Latin America and the Caribbean (ECLAC), 2022c). Moreover, foreign investment can be a tool to overcome the challenges that international aid is inefficient for sustainable development. In developing countries are various international organizations and international donors working to support development. Latin America and Caribbean ranks third place in receiving ODA after Western and Eastern Africa. South America countries receive an average of 4 billion dollars between 2000 to 2020 (World Bank, 2023). Additionally, in South America are present mechanism and strategies promoted by international organizations. For example, Blended Finance is one of the strategies use of development finance for the mobilization of finance towards sustainable (Organisation for Economic Co-operation and Development (OECD), 2023). However, in South America is questioned the effectiveness of aid. Several studies establish that ODA is inefficient achieving economic growth due to corruption and poor governance in recipient countries (Martin & Anguelov, 2018). Additionally, previous studies find that ODA has a negative impact in the long run (Neira et al., 2016). Therefore, international aid is considered effective in determined issues of development but inefficient for all SDGs.

South America countries have the opportunity to promote sustainable development through FDI. This region has diverse features to attract foreign investors. The abundant of natural resources is one of the most relevant factors that attracts foreign investment. Minerals, metal, oil, gas, timber and agriculture products are resources that foreign investors are looking for (OECD, 2023). In the last years, resources that help to a transition to a greener energy production rise attention in this region. However, the lack of financial resources can push these countries to attract FDI by promoting weak environmental standards (Fang, 2021). Moreover, South America countries implemented strategies to promote foreign investment in target industries (Zapata & González, 2021). Free Trade Agreements (FTA) are the most important strategy applied by these countries since 2000s. Furthermore, the market size of this region is a relevant determinant of FDI. South America has growing consumer market with a population over 400 million people (ECLAC, 2022a). Nevertheless, political instability and corruption

penalize these countries. For example, Peru and Brazil obtained lower FDI due to political instability and corruption respectively in 2018 (OECD, 2019).

Since 2000s, foreign investment has a path of growth that started when developed countries increased their demand for exports of natural resources for South America (Agosin, 2009). Additionally, FDI increase as result of the growing influence of China in this region (Roy, 2022). In 2021, FDI was around \$88 billion, and increased 74% percent versus the previous year (United Nations, 2022). Even though, the total inflows were below the pre-pandemic levels, most of the economies experienced a strong rise of FDI. The mining and energy sectors contribute significantly to the growth of foreign investment in South America, especially for Brazil, Chile and Colombia (UNCTAD, 2022). Moreover, in 2021, foreign investment in sectors relevant for sustainable development increased by 70 per cent in the region (UNCTAD, 2022). For example, renewable energy projects are the most prominent for foreign investment in this region.

The region has a positive sustainable development progress in the last twenty years. The sustainable index, which is a measure of sustainable development, increased in all of the countries of South America. In 2000, the lowest value was 58.98 and the highest value was 70.13 in South America countries. Then, in 2021, the lowest value was 67.08 and the highest value was 77.77 (United Nations, 2022). Even though, there is a relevant improvement to achieve the SDGs in South America. The lack of financial sources is a big challenge in these countries. In this scenario, foreign investment is a key factor to support the implementation and improvement of all goals of the 2030 Agenda (Sachs et al., 2022). Additionally, international aid is not enough to encourage development in the region.

Thereby, South America countries could take advantage of the FDI to improve their achievement of sustainable development in the last twenty years. In South America, the debate focuses to if foreign investment promotes or hinder countries to achieve sustainable development. In this region is controversial due to type of foreign investment that receive these countries. Mainly to exploit natural resources or extract nonrenewable sources. However, foreign investors were looking to invest on greener projects that contribute to sustainable development in these countries (Vogt et al., 2021).

1.2 Aim and Research Questions

This research is motivated by the lack of research on the relationship between FDI and sustainable development in South America. A lot of studies are concentrated to analyze the correlation between FDI and economic growth. Then, few studies analyze the impact of FDI on environmental degradation. While the social issues are commonly discarded in the field of foreign investment in the region. There are not studies that implement a broad view to include the three dimensions of sustainable development and FDI.

Additionally, the studies of foreign investment and SDGs are typically focused in African countries. The diversity of South America countries will enrich the knowledge about foreign investment and sustainable development. South America countries has different socioeconomic characteristics between each other. The comparison of results between countries will let us type

appropriate and precise conclusions of this region. Moreover, the purpose of this thesis is to explore the influence between 2008 to 2019. This period of twelve years allows to have data of 106 sustainable indicators for a long period of time. Additionally, the study avoids biased results by the impact of covid pandemic and avoid the lack of data to measure sustainable development before 2008.

There is still a gap in literature regarding the influence of FDI on all the three dimensions of sustainable development, in order to guarantee sustainability in the host country (Aust et al. 2019). Mainly, it is because measure sustainability is difficult. Further, the three pillars are interconnected which complicate to understand how foreign investment contribute to each pillar and to sustainable development. This thesis aims to contribute to the discussion by combining indicators that allow to understand the performance and constraints of sustainable development in South America. A better understanding of the relation between FDI and sustainable development will let us provide policies and strategies which are relevant for this region.

FDI is considering the key determinant to achieve the goals established in the 2030 Agenda by the United Nations (Sachs, 2012). At the same time, FDI is a financial source that allow developing countries to overcome financial problems (Sachs et al., 2022). During 2008 to 2019, FDI as share of Gross Domestic Production (GDP) increase in the region (World Bank, 2023). Additionally, FDI is of greater importance as a financial source than ODA. For example, South America received 100\$ billion of FDI and 3\$ billion of ODA in 2008, and 110\$ billion of FDI and 2\$ billion of ODA in 2019 (World Bank, 2023). Lastly, since 2015, South America brings the attention of developed countries to support the transition to a more sustainable development that also benefit advanced countries (Vogt et al., 2021).

This thesis therefore aims to contribute to the research in foreign investment and sustainable development by answering the following research question:

How foreign direct investment has contributed to sustainable development in South America between 2008 to 2019?

The main research question will be answered with the guidance of the following sub-questions:

- 1) *How foreign direct investment has contributed economic dimension of sustainable development in South America between 2008 to 2019?*
- 2) *How foreign direct investment has contributed social dimension of sustainable development in South America between 2008 to 2019?*
- 3) *How foreign direct investment has contributed environmental dimension of sustainable development in South America between 2008 to 2019?*
- 4) *How does sustainable development and FDI differ between South America countries?*

1.3 Outline of the thesis

The research question will be answered with the help of panel data, containing information of nine South America countries Argentina, Bolivia, Brazil, Chile, Colombia, Ecuador, Paraguay,

Peru, and Uruguay. The research works with sustainable development indicators available in the World Bank data base which is a free and a public data source. The focus of this study is during 2008 to 2019. Most of sustainable development indicators were implemented at 2008. For previous years the data is forecasted which is not reliable for this study. Similarly, the research excludes 2020 and 2021 because various indicators are inconsistent.

To investigate the influence of foreign investment on sustainable development, econometric models will be conducted, using ordinary least squares (OLS), fixed effects and random effects estimations. The econometric models are based on the theoretical framework of foreign investment and sustainable development. The model is extracted from previous research studies that were applied in African countries to evaluate if the economic, social, and environmental dimensions increase with foreign investment. Moreover, panel data over time allows to obtain robust results to answer the main research question. Then, the variables of interest are analyzed in a descriptive way to examine the performance in each South America country over the years. Thus, the study can show the main differences between countries in the progress of sustainable development and foreign investment.

After this introduction, a chapter on the contextualization of the sustainable development performance in South America countries follows. Chapter 3 develops the theoretical framework for this thesis, including foreign investment, sustainable development, and foreign direct investment influence on sustainable development dimensions. Afterwards, Chapter 4 provides the methodology and data for this research, explaining data sources, method, and limitations. Chapter 5 provides the econometric results for the region, and describes the performance of sustainable development and foreign investment for each country. Then, the research brings the discussion of results and literature in Chapter 6. Finally, conclusions following in the last part of this investigation.

2 Contextualization

This section provides a brief overview to set this region context focusing on different aspects about sustainable development and FDI. Firstly, the context of sustainable development in South America is analyzed, followed by a section of the current challenges relates to the sustainable development goals for these countries. Then, the chapter describes the relation of FDI and sustainable development in South America. This chapter intends to facilitate the understanding of the results and dynamics of the quantitative analysis.

2.1 Sustainable Development Pathway South America

Since the introduction of sustainable development concept by the United Nations, South America countries make efforts to integrated the view of economic growth while considering environment limitations and social responsibility. In 2000s, the United Nations established the Millennium Development Goals (MDGs), with the aim of reducing poverty, guarantee access to health, improving the living conditions of people in the world, gender equality and ensure environmental sustainability (Ki-moon, 2015). The MDGs were the most important promise for the most vulnerable economies. In South America, this was the push for many governments to implement policies and strategies that support the achievement of the eight MDGs (Fanelli, 2016). For example, in 2003, Brazil launched “Bolsa Família” program to provide cash transfers to low-income families, with the goal of reducing poverty and improving access to education and healthcare. Similarly, in Colombia, efforts were made to improve access to education for children from low-income families, with the government implementing policies like the “Juntos Program” to provide financial support and other resources to families in need.

Many South American countries made progress towards achieving the MDGs, particularly in areas like education, healthcare, hunger prevalence, and gender equality (Ki-moon, 2015). These areas have a relevant improvement between 2000 to 2015. However, at end of 2015, there were still some challenges for this region. For example, in this region, the extreme poverty rate decreased in 2015, but did not reach the target proposed by the United Nations in the 2000s. Moreover, inequality, child mortality, women empowerment, women and children malnutrition, maternal health, and other targets in the MDGs still persist the need to work to have a better performance. Therefore, South America countries showed the necessity of work harder to achieve sustainable development in this period.

Then, in 2015 when the United Nations established the 2030 Agenda with new 17 SDGs, South America countries confronts new challenges to achieve the goals. The 2030 Agenda is a more ambitious than the MDGs, because it promises to leave no one behind (ECLAC, 2018). Costanza et al., (2016) explain that the 2030 Agenda is complex because is based on the overarching goal of simultaneously economic prosperity, high quality of life that is equitably shared and sustainable. In parts of South America, this concept is encapsulated in terms such as “buen vivir” or “pura vida”. Further, the new SDGs leads to create an association between countries in Latin America and Caribbean to implement properly the 2030 Agenda. Hence, in

2016, this region launched a regional forum called the Forum of the Countries of Latin America and the Caribbean on Sustainable Development. The forum helps South America countries to recognize sectors and strategies that promote the achievement of the 2030 Agenda (ECLAC, 2018).

Since 2016, in this region, the ECLAC created a report to evaluate the progress of the countries in the SDGs. In 2022, the last report of ECLAC highlights a slowdown in the achievement of the 17 SDGs since the CO-VID pandemic started. In this reports (Economic Commission for Latin America and the Caribbean (ECLAC), 2022b) concluded that the region returned to a path way of extreme vulnerability. During the pandemic crisis some of the most affected variables are poverty, inequality, employment, quality of life, productivity, technology advance, and environment. Additionally, they found that few indicators continue to perform better, but 68 percent of the goals indicators continue in a track that it is not enough to reach the 2030 Agenda (ECLAC, 2022b). Moreover, the backwardness of South America in the progress of sustainable development is notable when compare with developed regions.

Table 1 shows how the SDGs are performing for South America countries at 2021. From the data in this table, we can highlight the SDGs that these countries may achieve for the 2030 Agenda. In the case of Argentina, the more promises SDGs are Quality Education, Gender Equality, and Climate Action. For Bolivia is Reduced Inequalities, Climate Action, and Partnerships for the Goals. For Brazil is Quality Education, Clean Water and Sanitation, Affordable and Clean Energy, and Climate Action. For Chile are No poverty, Clean Water and Sanitation, Affordable and Clean Energy, Sustainable Cities and Communities, and Partnerships for the Goals. For Colombia are Responsible Consumption and Production, and Climate Action. For Ecuador is Clean Water and Sanitation, Affordable and Clean Energy, Industry Innovation and Infrastructure, Sustainable Cities and Communities, Responsible Consumption and Production, and Climate Action. For Paraguay is No poverty, Clean Water and Sanitation, and Climate Action. For Peru is Quality Education, Affordable and Clean Energy, Responsible Consumption and Production, and Climate Action. Lastly, for Uruguay is No Poverty, Quality Education, Clean Water and Sanitation, Affordable and Clean Energy, and Sustainable Cities and Communities.

Table 1 Sustainable Development Overview at 2021

SDG	Argentina	Bolivia	Brazil	Chile	Colombia	Ecuador	Paraguay	Peru	Uruguay
SDG1: No Poverty									
SDG2: No Hunger									
SDG3: Good Health and Well-Being									
SDG4: Quality Education									
SDG5: Gender Equality									
SDG6: Clean Water and Sanitation									
SDG7: Affordable and Clean Energy									
SDG8: Decent Work and Economic Growth									
SDG9: Industry, Innovation and Infrastructure									
SDG10: Reduced Inequalities									
SDG11: Sustainable Cities and Communities									
SDG12: Responsible Consumption and Production									
SDG13: Climate Action									
SDG14: Life Below Water									
SDG15: Life on Land									
SDG16: Peace, Justice and Strong Institutions									
SDG17: Partnerships for the Goals									

Source: United Nations, 2022.

Even though South America countries are progressing in many goals (green and yellow arrows). Table 1 shows that each country has goals that will not be achieved in the 2030 (red and orange

arrows). Definitely South America countries confront challenges to achieve the 2030 Agenda. In this context, the ECLAC advice main issues in each dimension of sustainable development.

In the economic dimension, ECLAC (2022b) highlight three main issues that hamper the performance for an achievement of 2030 Agenda. In South America countries, diverse sectors cannot compete in the international market due to low productivity. The lack of advance technology does not let these countries to confront the challenges in the global market against developed countries. Additionally, many South America countries lack access to the technology and infrastructure necessary for sustainable development (ECLAC, 2022b). Political uncertainty is the second challenge in the economic dimension. Several countries in South America have experienced political instability between 2000 to 2020, which can hinder progress towards sustainable development (OECD, 2019). Thereby, these countries could not respond to the challenges that confronted in the last years. Lastly, South America is vulnerable to global economic challenges such as trade tensions, commodity price fluctuations, and pandemics. Which is critical because the region is a strong producer of raw materials since 2000s (Fanelli, 2016).

At the social dimension the most relevant challenge in the region is the economic inequality which is highlighted by ECLAC, OECD and United Nations. South America has some of the highest levels of income inequality in the world, which can delay progress towards sustainable development (World Bank, 2023). Then, ECLAC (2022b) mentions that social exclusion impacts the performance of various objectives for South America countries. For example, marginalized population frequently lack access to basic services such as healthcare, education, sanitation, clean water, and other services. Especially the region needs to make efforts to include the most vulnerable groups of the society such as children, women and indigenous to access to equal opportunities in the economy (ECLAC, 2021).

Lastly, in the environmental dimension, the critical challenge is stop environmental degradation. South American countries are characterized by their richness in natural resources and biodiversity (Vogt et al., 2021). These countries are home to valuable ecosystems such as the Amazon rainforest in Brazil, Colombia, Ecuador, and Peru. These valuable ecosystems are threatened by deforestation, pollution, and climate change (Ki-moon, 2015). Moreover, the climate crisis emergency is the other huge challenge for developing countries. The cost of climate crisis can be reflected in the environment, as well as in the society and economy of the region (Sachs, 2012).

South America addresses an agenda with multidimensional view to solve the challenges of each dimension of sustainable development (ECLAC, 2021). However, these countries still require policies that promote inclusive economic growth, employment creation, access to education and healthcare, social inclusion, promotion of innovation and investment in technology, economic resilience and diversification. Additionally, the most relevant challenge is to address the balance between economic growth and environmental degradation. This region illustrates that after a great period of economic growth, due to exploitation of natural resources, these countries usually suffer the destruction of their ecosystem and development failures (Fanelli, 2016) (Papyrakis & Pellegrini, 2019).

2.2 The Conflict Between Natural Resources and Sustainable Development

South America countries is a region with plenty natural resources, including oil, minerals, agricultural land, and water (Vogt et al., 2021). The exploitation and exportation of these resources have historically been a significant driver of economic growth in the region, since 2000s (Fanelli, 2016). However, the relationship between natural resources and sustainable development in this region is complex and has been subject to numerous challenges. The abundance in natural resources influence in different ways each dimension of sustainable development.

The most emblematic conflict is in the economic dimension between economic growth and natural resources degradation. The literature and empirical evidence offer a broad point of view of the relationship between natural resources and economic growth in developing countries. One of the most relevant articles is by Sachs and Warner (1995) where they argue that the impact of natural resources on growth is negative. Which is known as the “natural resource curse”. The resource curse hypothesis suggests that countries that possess abundance in natural resources are more likely to experience poor economic growth and other developmental problems (Papyrakis & Pellegrini, 2019). Fanelli (2016) argues that the natural resource curse is evident in South America countries.

South America countries have been targeted to extract natural resources since the colonial era. This region suffers from short period of economic growth from the extraction of natural resources. Thus, developing countries lack of success to developed countries. Toscani (2017) explain that it is the result of natural resources higher volatility in the global market. Moreover, Lederman and Maloney (2007) explain that South America countries under performance economic growth is due to their deficiency to upgrade technology in their industries. In these countries persist a weak national learning capacity to promote research and innovation (Maloney, 2007). In other words, South America is not recognized for improve physical and human capital. However, at the present juncture there seem to be widespread a positive idea that natural resources can help to improve economic growth in this region (Haarstad, 2012). For example, in some countries of South America, the exploitation of natural resources let positive externalities such as create new productive chains or new activities in their economy (Fanelli, 2016).

In the social dimension the main issue is the distribution of land and wealth of natural resources. In this region, most of the land and natural resources are concentrated in hands of few people (Lederman & Maloney, 2007). Although the region applied land reforms, the region still shows territorial conflicts between government and rural communities (Fernandes et al., 2018). Moreover, Fanelli (2016) explain that in South America the governments usually are inefficient to promote equal distribution of the wealth of natural resources. Most of these countries failed to distribute the resources revenues in the population while other countries success. Indeed, this is the result of the quality of institutions in the territory. Havranek et al. (2016) argue that high institutions quality let countries to avoid inequality of distribution. Furthermore, another critical point is that South America countries deficiency to manage natural resources wealth to invest in human capital to ensure social development. For example, developed countries showed that

invest in human capital increase social development such as the Scandinavian countries with wood revenues (Lederman & Maloney, 2007).

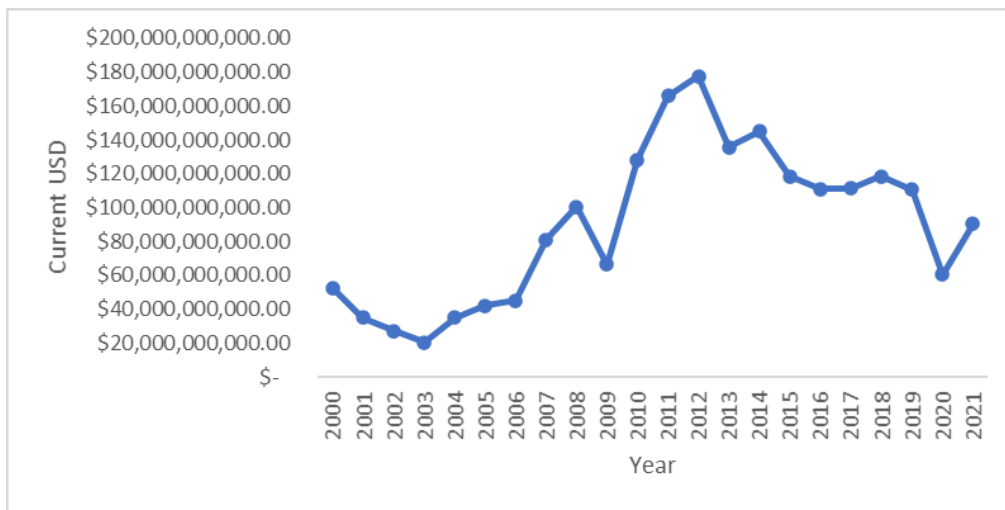
Another challenge is the impact of resource extraction on the environment in South America countries. The extraction of natural resources often involves significant environmental damage, such as deforestation, pollution, and soil degradation, which can have long-term consequences for local ecosystems. The effect will depend if it is a nonrenewable or renewable source. Each of the natural resources comes with its own set of problems tied up into the global crises of biodiversity loss, climate change, and unsustainable economic activity (Gross, 2014). In this region, an enormous quantity of natural resources used to generate income is nonrenewable resources. For example, mining in Chile and Peru or oil extraction in Ecuador (Vogt et al., 2021). In these countries are required to account the environmental degradation impact in their territory. Furthermore, South America countries are recognized to provide a huge quantity of agriculture products to developed countries. For example, Colombia and Ecuador each with production of coffee and banana respectively, among other agriculture products (ECLAC, 2023). In the case of renewable resources, the literature suggests that South America has to consider the intergenerational equity of resources to ensure natural resources for the future generations (Fanelli, 2016). Indeed, some countries in this region established policies and strategies to avoid environmental degradation is still required (ECLAC, 2022b).

2.3 FDI and Sustainable Development South America

Foreign investment is an opportunity for South America to overload the issues of lack of financial sources for sustainable development (ECLAC, 2022a). On one hand, the region lacks of structure to properly use the resources and to create fiscal expansion (ECLAC, 2022c). The region fails to address challenges such as poverty or low productivity. Moreover, the fiscal expansion is in crises due to the drop in tax collection in the region. Additionally, the region is one of the most heavily indebted in the world with a debt equivalent to 59 percent of the exports of goods and services in 2021 (ECLAC, 2021b). Thus, the region needs to search for other financial sources to support sustainable development.

FDI has an unstable pathway during 2000 to 2021 (Figure 1). In 2010, the region experienced the most relevant growth of the period. While in 2020, the region receives a drastically decrease of foreign inflows due to Covid pandemic (Delgado & Hernandez, 2022). In general terms, when the region receives less FDI means fewer financing resources available.

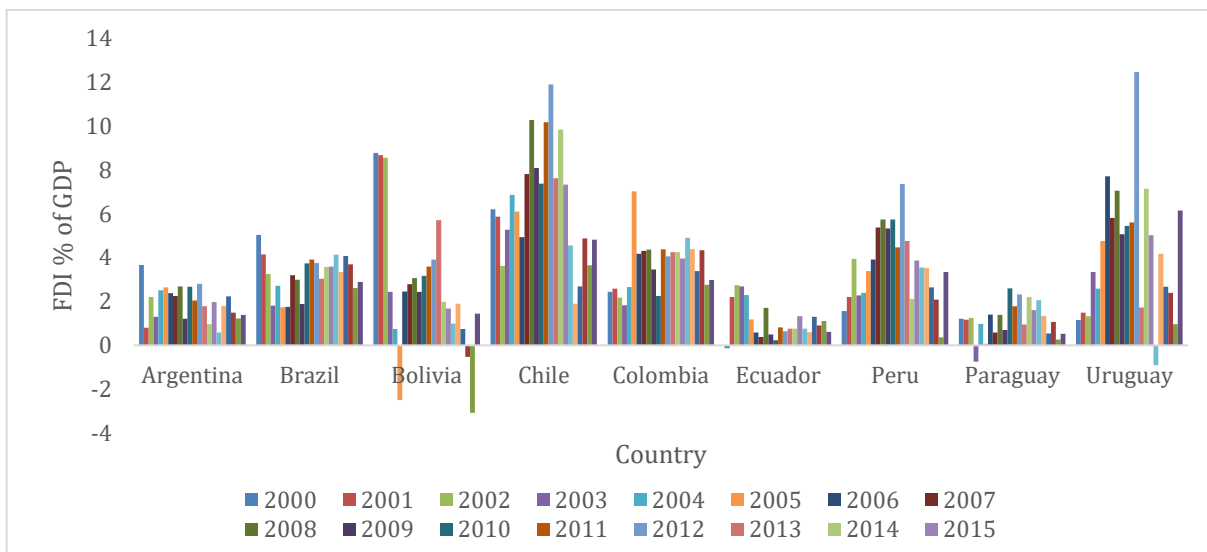
Figure 1 Direct Foreign Investment in South America 2000 – 2021



Source: World Bank, 2023.

South America countries shows different performance of foreign investment between 2000 to 2021. According to the World Bank data base, Brazil is the country that receives the greatest amount of foreign investment inflows in the region. In 2021, Brazil receives foreign investment inflows for 41\$ billion (World Bank, 2023). However, when the FDI is analyzed as percentage of GDP, the panorama changes for the region. Figure 2 illustrates the performance of the nine South America countries during 2000 to 2021. Uruguay is the country with a higher quantity of foreign investment inflows by 6.15% in 2021. Followed by Chile (4.8%), Peru (3.3%), Colombia (2.9%), and Brazil (2.8%). Obviously, this classification change over the period studied. Additionally, it is important to consider that FDI goes to diverse sectors in each country.

Figure 2 Foreign Direct Investment South America Countries 2000-2021



Source: World Bank, 2023.

For South America is important to know to which sector is focused the foreign investment inflows. ECLAC (2021) argues that foreign investment has to focus in the driving sectors that

encourage sustainable development. Renewable energy, electromobility, digitalization, health industry, bioeconomy, circular economy and tourism are the seven driving sectors of sustainable development proposed by ECLAC. The synergies between the seven sectors are essential in the region (Cordero, 2022). For example, in the last decade, the foreign investment in the renewable energy sector increase allowing the region to promote electromobility in cities, and social and digital inclusion (ECLAC, 2021).

Nevertheless, this region receives a relevant amount of investment in industries that are associated with environmental degradation and social conflicts. South America suffers the issue of raw materials exploitation which disrupt the process of sustainable development (Perez, 2010). For example, Ecuador is a great example of the conflict process of sustainable development base on oil exploitation during the last twenty years (Guzman, 2012). In Ecuador, the 50 percent of foreign investment is concentrated in the oil and mining exploitation since 2000s (Banco Central del Ecuador, 2022). This country suffers social conflicts between foreign companies and rural communities, and a huge damage in the ecosystem after a period of natural resources exploitation.

Other issue that confronts South America countries is that the majority of FDI is focused on developed countries. In ECLAC (2022a) report, the data shows that almost three-quarters of the global increase of FDI was located in developed countries in North America, Asia and Europe in 2021. Moreover, Vogt et al., (2021) mentioned that foreign companies are avoiding developing countries due to the lack of policies that ensure sustainable development.

3 Literature Review

This section discusses relevant theories and concepts on the relation between foreign direct investment and sustainable development. The theoretical framework is then used as a basis to examine the specific results of this study. Additionally, the literature review brings the framework require to answer the research questions.

3.1 Foreign Direct Investment

Foreign investment has been a subject of interest in developed and developing countries. Since 1990, Foreign Direct Investment (FDI) came to be a relevant financial source for developing countries (Gallagher & Zarsky, 2009). In general terms, FDI means the transfer of tangible or intangible assets from one country into another for the purpose of use in that country to generate wealth (Afrin, 2004). Moreover, FDI reflects the objective of establishing a long-run relationship between one country and an enterprise or firm that is resident in another country (OECD, 2008, p.22).

This financial investment source can be classified into three different groups; horizontal investment, vertical investment, and conglomerates. Gallagher et al. (2009) explain that the horizontal foreign investment occurs when a company has business operations in different parts of the world, such as multinational corporations. In other words, a firm decided to replicate their operations in other countries. The vertical foreign investment is when a company acquires a complementary part of the business in another country. In most of the scenarios, this occurs when firms look for low-costs locations such as countries with low-cost labour (Blonigen & Piger, 2014). Lastly, conglomerates take place usually as joint ventures when a company invests in a foreign investment that is unrelated to its core business (Gallagher & Zarsky, 2009).

3.1.1 Foreign Investment Determinants in Developing Countries

Previous studies show that diverse factors determine the inward of foreign investment in a country. The Neoclassical theory suggests that foreign investment is driven by imperfections in the market related to production factors (Gallagher & Zarsky, 2009). That means that FDI is allocated where production is more efficient. However, other authors contrast arguing that macroeconomics factors and government policies of the host country are determinants of FDI (Dunning, 1994). On one hand, government policies can encourage or hinder the allocation of FDI, depending of the host country approach. On the other hand, the evidence in this field is ambiguous. But from previous research can be identified the most important macroeconomic factors for developing countries. Thus, FDI is influenced by; market capacity, liberalization, partnerships, incentives, political stability, and resources availability.

Market capacity group two relevant characteristics that is market size and market stability. Market size attracts foreign investment in both developed and developing countries; therefore, it is the most unambiguous factor (Gallagher & Zarsky, 2009). This factor has clearly stated the importance of the size of the host economy that is usually captured by the GDP per capita. So,

foreign investment will be allocated in countries with higher GDP per capita. Moreover, in this context, market stability is required to promote inflows of FDI. Economou et al. (2017) explain that countries with high inflation and high-country risk are negatively related to foreign investment inflows.

Liberalization have been popular globally as a means of attracting FDI in the last decade (Lopes et al., 2020). In developing countries is require some minimal governmental intervention through robust institutions that provide a favorable investment environment. Reducing bureaucracy and the role of the state in private transactions could facilitate the entry of new investors (Lopes et al., 2020). However, the literature suggests that deregulation can cause many risks in various sectors in the host economy.

Partnerships has also been considered as an important factor affecting FDI inflows in developing countries (Economou et al., 2017). The host country authorities will engage international investors to target sectors in the economy (OECD, 2008). The objective is increase investment inflows and reduce investment uncertainties. For example, regional integration is a key factor in the globalization (Lopes et al., 2020). Thus, countries with international trade agreements can be more attractive to foreign investors.

Incentives has the objective to promote and facilitate foreign investment inflows in the host country. This tool can take several forms such as tax exceptions, cash grants and others (Lopes et al., 2020). For example, corporate taxation can be positive or negative related to attract foreign investment. Evidence show that tax incentives has proved to be beneficial for encourage foreign inflows but double taxation discourage foreign investment (Economou et al., 2017). Moreover, incentives are a good way to influence resource allocation in developing countries (Gallagher & Zarsky, 2009).

Political stability is significant to show an secure financial environment to attract FDI (Lopes et al., 2020). Gallagher and Zarsky (2009) argue that political stability is positive correlated with FDI in developing countries. Moreover, corruption and weak law enforcement may discourage international investors (Economou et al., 2017). Both factors show lack of economy transparency in the host country.

Resources availability refers to two relevant sources for developing countries. On one hand, human capital costs and skills. Labour cost is another relevant factor for foreign investment. Studies show that low-labour costs and low-labour standards do not necessary increase FDI inflows, but they are a relevant specially in developing countries or less developed countries (Blonigen & Piger, 2014). Nevertheless, when the knowledge and expertise is needed, high human capital skills are a relevant factor attracting foreign investment (Afrin, 2004). On the other hand, the literature critical debate about the role of natural resources as a feature to attract FDI. Gallagher and Zarsky (2009) explains that there is no consistent statistical evidence but many industries are attracted by countries with lower protection standards and abundance of natural resources.

3.2 Sustainable Development

Scientist concerns regarding the resource and absorption capacity limits and general environmental deterioration motivated to create the concept of sustainable development (Islam & Iversen, 2018). Thereby, in 1987, the World Commission on Environment and Development (WCED) introduced for first time the concept of sustainable development in the report “Our Common Future”. The United Nations defined sustainable development as development that meets the needs of the present without compromising the ability of future generations to meet their own needs (Voica et al., 2015). Two key concepts appeared as result of the introduction of sustainable development. First, the concept of “needs” focused in the poor population in the world, and second, the “limitations” imposed by technology and social organization on the environments ability to meet the present and futures needs (WCED, 1987, p.41). This suggests a tradeoff between environment sustainability and economic development for developed and developing countries.

In 1972, United Nations started to play a key role in the movement of sustainable development around the world. Thus, in Stockholm, was held the first Earth Summit, whose objective was to engage world leaders in discussing the critical challenges related to the planet boundaries (Zapata & González, 2021). However, until 2000, the world was working without sustainable goals. At the Millennium Summit of the United Nations, eight MDGs were established: to eradicate extreme poverty and hunger, to achieve universal primary education, to promote gender equality and empower women, to reduce child mortality, to improve maternal health, to combat diseases, to ensure environmental sustainability and to develop a global partnership for development (Voica et al., 2015).

Then, many governments and members of international organizations realized the need to place environmental concerns more at the center of global development (Islam & Iversen, 2018). Thus, In September 2015, the Agenda for Sustainable Development was announced as an action plan by all 193 members of the United Nations to transform the world by 2030 (Izadi & Madirimov, 2023). The United Nations launched 17 Sustainable Development Goals (SDGs) and 169 targets covering economic, social and environmental dimensions for developed and developing countries (Table 2). The SDGs are an integrated framework of human, social, and environmental development which promote peace and prosperity for people and the planet, for current and future generations (Izadi & Madirimov, 2023).

Table 2 Sustainable Development Goals for 2030 Agenda

Dimensions	Goals	Definition
Social Dimension	SDG 1 No Poverty	End poverty in all its forms everywhere.
	SDG 2 Zero Hunger	End hunger, achieve food security and improved nutrition and promote sustainable agriculture.
	SDG 3 Good Health and Well-being	Ensure healthy lives and promote well-being for all at all ages.
	SDG 4 Quality Education	Ensure inclusive and equitable quality education and promote lifelong learning opportunities for all.
	SDG 5 Gender Equality	Achieve gender equality and empower all women and girls.
Economic Dimension	SDG 6 Clean Water and Sanitation	Ensure availability and sustainable management of water and sanitation for all.
	SDG 7 Affordable and Clean Energy	Ensure access to affordable, reliable, sustainable and modern energy for all.
	SDG 8 Decent Work and Economic Growth	Promote sustained, inclusive and sustainable economic growth, full and productive employment and decent work for all.
	SDG 9 Industry, Innovation, and Infrastructure	Build resilient infrastructure, promote inclusive and sustainable industrialization and foster innovation.
	SDG 10 Reduced Inequality	Reduce inequality within and among countries.
	SDG 11 Sustainable Cities and Communities	Make cities and human settlements inclusive, safe, resilient and sustainable.
	SDG 12 Sustainable Consumption and Production	Ensure sustainable consumption and production patterns.
Environmental Dimension	SDG 13 Climate Action	Take urgent action to combat climate change and its impacts.
	SDG 14 Life below Water	Conserve and sustainably use the oceans, seas and marine resources for sustainable development.
	SDG 15 Life on Land	Protect, restore and promote sustainable use of terrestrial ecosystems, sustainably manage forests, combat desertification, and halt and reverse land degradation and halt biodiversity loss.
	SDG 16 Peace, Justice and Strong Institutions	Promote peaceful and inclusive societies, provide access to justice for all and build effective, accountable and inclusive institutions at all levels.
	SDG 17 Partnership for the Goals	Strengthen the means of implementation and revitalize the Global Partnership.

Source: United Nations, 2015.

The SDGs represent a call to action to address the negative impacts of economic growth on society and the environment (Zapata & González, 2021). According to Izadi & Madirimov (2023) the 17 SDGs are interrelated to each other in a systematic way although all SDGs represent separate goals. Countries cannot prioritize one goal over other goal, in this case governments have to work to achieve the 17 SDGs to avoid negative effects in sustainable development. Therefore, in the 2018s, the United Nations proposed a transformative change to achieve the 2030 Agenda.

3.2.1 Transformative Change

Transformative Change is a new propose to focus in economic concerns, social development and environmental protection to achieve the objectives of the 2030 Agenda. At first time, structural change was recommended for developing countries. Islam & Iversen (2018) explain that structural change is the neoclassical proposal to achieve economic growth through technological progress. Since agriculture sector is considered the traditional sector, and manufacturing the modern sector, structural change is considered modernization. In this concept, technology advances allow economies to change from traditional sector to a modern sector. Hence, the key point is that countries have to become a high productivity economy to reach economic growth. However, in the current globalization, countries have followed a structural change that is not suitable for sustainable development (Izadi & Madirimov, 2023).

The main problem in the process of structural change is the limit capacity of the planet to supply resources and to absorb the waste generated in the process (Islam & Iversen, 2018). Therefore, the United Nations argue that developed and developing countries need to adopt the transformative change, and not only the structural change to achieve the objectives of the 2030 Agenda. Transformative change is related to the concept of limit carrying capacity. This suggest that there are boundaries to the planet capacity to provide natural resources that human societies need and to absorb the waste they generate through the use of resources (Islam & Iversen, 2018). Thus, the concept of transformative change provides a wider view to understand the three dimensions of sustainable development and their interlinkages (Sachs et al., 2019).

Based on the idea that transformative change is a promised concept to achieve the 2030 Agenda. The International Institute for Applied Systems Analysis, the Sustainable Development Solutions Network, and the Stockholm Resilience Centre, proposed six transformations to achieve the SDGs of the 2030 Agenda. The six transformations are summarized; (1) promote education and gender equality, (2) promote key investment in health and wellbeing, (3) promote modern energy sources and energy decarbonization and reduce industrial pollution, (4) promote sustainable food system and protect land, water and oceans, (5) construct sustainable cities, urban areas and communities, and (6) a digital revolution for sustainable development (Weiland et al., 2021, p.3). Moreover, (Sachs et al., 2019) explain that the six transformations require technical feasibility, finance through public and private sources, resolve tradeoffs, accelerate innovation of new technologies, policy coherence between macro and micro economy levels, and civil-society engagement.

The main point is that all of these transformations can contribute to impulse sustainable development. In this context, transformative change subsumes structural change. The 2030

Agenda for sustainable development aiming at transformative change includes structural change as an important component. However, this structural change has to be such that it promotes sustainable development (Islam & Iversen, 2018). The strategy to rely on modular transformations is an attempt to take a holistic perspective that integrates all possible domains affected while at the same time simplifying the complex interlinkages and interventions in the SDG system (Weiland et al., 2021).

3.3 Foreign Direct Investment on Sustainable Development

After the 2000s, FDI came to be seen as a financial source for economic growth in less developed countries (OECD, 2002). Thus, policies to attract FDI became the centerpiece of both national development strategies and supra-national investment agreements (Gallagher & Zarsky, 2009). It is important to clarify, that FDI effects on sustainable development depend on the socioeconomic characteristics of the host country (Economou et al., 2017). However, this section explains the positive and negative effects of foreign investment on each dimension of sustainable development.

3.3.1 FDI on Economic Dimension

According to the neoclassical theory, FDI will benefit economic development in the host country by directly or indirectly effects. First of all, foreign investment will stimulate economic growth by filling the deficit capital in the developing countries (Ayamba et al., 2020). The new capital will help the host country to initiate production in activities that lack of investment. Additionally, foreign investment will directly accelerate economic growth by increasing capital formation and growth employment (Aust et al., 2020). Further, FDI directly encourage economic growth by market growth in the host country. The new investment inflow can create demand for local firms in the same industry or suppliers related to the foreign industries (Gallagher & Zarsky, 2009).

On the other hand, FDI is able to hasten economic growth indirectly by diffusing new knowledge and enhancement of technological progress. FDI will spillover knowledge by bringing greater technology and management skills that stimulate domestic investment and integrate host country's firms into global market (Gallagher & Zarsky, 2009). Furthermore, foreign investment influence backward linkages that help to develop diverse sectors which not necessarily are connected to the foreign firm (Gallagher et al., 2009). This is possible, because FDI brings technology that can work in more than one sector or industry in the host country (Sachs et al., 2019). Moreover, FDI is a tool of the internationalization for companies. Thus, FDI plays a vital role in the host country by changing the industry, commerce or other economic activities (Martins et al., 2022).

For Sachs et al. (2019) the indirectly effects are the most relevant to boost sustainable development. The authors consider that technology is a main driver of sustainable development. However, foreign investment can also generate negative effects in developing countries.

Gallagher et al. (2009) argue that FDI can generate competition in an industry which can wipe out local firms by unfair competition between foreign and domestic companies. Additionally, for local firms adopt new technology might be to advanced especially for less developed countries. Moreover, Kardos (2014) explains that excessive foreign investment can crowd out domestic investment as result of market inequalities. Foreign firms have specific advantages like economies of scale, which allow them to produce more with less cost than local firms. Thus, local firms will be forced to leave the industry.

3.3.2 FDI on Social Dimension

For the social dimension, in the literature we can find the following positive effects ending poverty and improving living standards. ECLAC (2022b) explains that poverty causes a lot of social problems in developing countries such as low life expectancy, malnutrition, low school attendance, and others. Kardos (2014) explain that foreign investment cannot help directly to decrease poverty but indirectly FDI helps to decrease poverty by creating employment. Foreign investment can create new demand for labour in the host country that local firms cannot create. Additionally, FDI can increase income levels which consequently improves better living standards in the domestic country (Ayamba et al., 2020). When the income level increase, the population can access to better education, health, food and services. Additionally, FDI can reduce inequality and poverty, if the host government apply an appropriate mechanism to distribute the income gained for taxing foreign companies (Economou et al., 2017).

Furthermore, one of the most important effects is that FDI improves human capital formation through knowledge and technological spillovers (Martins et al., 2022). Foreign investment firms require skilled workers to manage the new technology or to learn new knowledge. Thus, FDI improves the education quality of the host country. Moreover, Gallagher and Zarsky (2009) emphasize that FDI can contribute to enforcing human rights in developing countries. Human rights enforcement can be pressured by powerful foreign companies but depend on the quality of institutions.

Nevertheless, FDI can promote inequality and poverty without the correct intervention of local institutions (Aust et al., 2020). When foreign investment only requires skilled workers, income inequality and poverty increase in the host country. Moreover, FDI can influence negatively on human rights specially in developing countries. Foreign firms can encourage policies with low-labour standards to benefit from higher profits (Gallagher & Zarsky, 2009). Additionally, foreign firms can encourage unsafe working conditions or exploitation of workers. In this dimension, empirical evidence of the social consequences of FDI is controversial. Therefore, the United Nations argue that the effects of foreign investment on the social dimension, in developing countries, will depend on the policies and regulations in the host country (Havranek et al., 2016).

3.3.3 FDI on Environmental Dimension

Empirical evidence of the environmental consequences of FDI is abundant. According to the Kuznets curve, economic growth originates in the first phase of environmental deterioration;

then, economic growth generates a subsequent phase of environmental improvement (Aust et al., 2020). In the second phase, when the income increased due to economic growth as result of more inflows of FDI, populations will demand higher living standards. Martins et al. (2022) explain that the higher living standards are related to higher environmental standards like clean air, sanitation, and clean water. Additionally, in the long run, dwellers will demand more green products and services that push the companies to use greener technologies in the production process (Ayamba et al., 2020). Further, population will claim for stricter regulations on industries that impact negatively in the environment (Izadi & Madirimov, 2023).

Regarding the environmental dimension, academics work with two important theories, the pollution halo hypothesis and the pollution haven hypothesis. The pollution halo hypothesis assumes that FDI brings positive externalities. FDI through technology transfer and best management practices reduce pollution in the host country (Martins et al., 2022). Foreign companies bring more advanced pollution control technologies and environmental management systems which will help improve the environmental quality of the host country (Fang, 2021). The ECLAC (2021a) believe that FDI mainly can help to improve technology in developing countries to avoid environmental degradation by inefficient industries in the domestic market. Moreover, Kardos (2014) explain that FDI can support projects in areas where developing countries require advance technology such as renewable energy or recycling.

On the other hand, the second hypothesis assumes that the investment of high-income economies in developing countries may be prejudicial for host countries as it transfers polluting technologies, goods, and services to those countries (Aust et al., 2020). FDI seeks locations with weak regulations, generating weaker environmental standards in host countries (Kardos, 2014). In this scenario, foreign investment in developing countries, is searching for manufacturing or extractive industries that cannot perform in their home country. For example, mining and quarrying are pollution intensive activities that are usually promoted by FDI in less developed countries (Aust et al., 2020). Moreover, the pollution haven hypothesis states that local authorities create pollution by lowering their environmental standards and regulation to attract FDI (Martins et al., 2022). If developing countries have weak environmental position, the foreign companies shift polluting activities to these countries.

4 Data and Methodology

This chapter describes the data and methodology used in this study. While taking the literature review as guidance. In this section is explained the method, variables with their respectably sources, and model specifications. Additionally, the chapter includes the limitations of this research.

4.1 Data Description

In order to answer the main research question, the data of the following countries is taken into consideration; Argentina, Bolivia, Brazil, Chile, Colombia, Ecuador, Paraguay, Peru and Uruguay. The World Bank has a database with 404 indicators that are related to sustainable development. Similarly, as in other studies, this database has various non-existent data for South America countries which force us to exclude many indicators. Thus, for the nine countries are available 106 indicators which form twelve of the seventeen SDGs. Then, the twelve SDGs are used to measure the three dimensions of sustainable development (economic, social, and environmental). The list of indicators can be found in Appendix A. Additionally, the same database source provides the foreign investment and population data for these countries. Moreover, for the second question, foreign investment by sector is extracted from ECLAC data base.

The time frame was selected as result of the availability of data. Most of the indicators for sustainable development started to be measured at 2008, so previous years were forecasted by the World Bank. Moreover, after 2019s, the Covid pandemic affected the measurement of the sustainable development indicators. Indeed, for 2020 and 2021 is missing data for many indicators. Therefore, to avoid mistrust data before 2008 and after 2020. The study focusses in South America during the period 2008 to 2019.

4.2 Methodology

This study intent to examine the influence of FDI on the economic, social and environmental dimensions of sustainable development in South America countries. Thereby, the three dimensions are tested by three models. Panel data methodology is used as in similar studies of African countries. This type of data can offer less collinearity among variables and more liberty and efficiency in the econometric analysis (Gujarati, 2003). Moreover, Martins et al. (2022) explain that analyzing massive amounts of data simultaneously can reduce or minimize bias that could occur in an aggregate small sample.

For this research, the 106 indicators form 12 SGDs, so five SDGs are not considered due to lack of data (Table 3). In order to run the regression model, each dimension of sustainable development has to be calculated. The values of the indicators are presented on different scales such as values in percentage, per million, per ton or per capita. In this sense, to obtain scores for the 12 SDGs, it is necessary to transform the indicators into the same measurement scale

(Martins et al., 2022). Thus, first, we had to normalize all the values on the interval [0, 1], using the following procedure:

$$NI_k^{it} = \frac{I_k^{it} - \min(I_k^{it})}{\max(I_k^{it}) - \min(I_k^{it})}$$

Where k is the indicator number (k=1, . . . ,106), i represents the country (i=1, . . . ,9) and t represents the year (t=2008, . . . ,2019). Thus, I_k^{it} is the new score value of each indicator for country i in the year t. After this procedure, all indicators are in the same scale. Notably, we have many prejudicial indicators which means the higher the value, the more negative the effect will be for sustainable development. For example, people practicing open defecation (full list in Appendix A). Thus, we have to invert those indicators to follow the same guideline as the positive indicators. So, one minus the prejudicial indicator value is performed to obtain the real value. Then, we performed an arithmetical mean of the indicators that compose each SDG to obtain 12 SDGs for this research.

Moreover, to calculate the economic, social, and environmental dimensions, the SDGs are linked to a sustainable dimension. According to Costanza et al. (2016) for sustainable development is not true that the SDGs are independent of each sustainable dimension. That the main idea is that SDGs contribute equally to the overarching goal. Thus, Table 3 contains the 12 SDGs to each sustainable development dimension based on Costanza et al. (2016) framework. The SDG1, SDG4, SDG10, SDG13, and SDG16 are missing due to lack of data for South America.

Table 3 Sustainable Dimensions and Sustainable Development Goals

Dimension	SDGS
Economic	SDG3, SDG7, SDG8, SDG9, SDG11, SDG12, SDG14, SDG17.
Social	SDG2, SDG3, SDG5, SDG6, SDG7, SDG8, SDG15, SDG17.
Environmental	SDG2, SDG6, SDG14, SDG15.

We performed an arithmetical mean of the goals corresponding to obtain a value score for economic, social, and environmental dimension. Then, we have a data set of 108 rows (9 countries with 12 years each) and the economic, social, and environmental dimensions as columns. Additionally, two columns are added for foreign investment (foreign direct

investment net inflows) and population (population growth) which both are provided by the World Bank data base. As with the sustainable development indicators, we perform the same normalization process to obtain a score value between the interval [0,1]. Thus, finally the data set is composed with 108 rows and 5 columns.

Afterwards, to measure the influence of FDI on the economic, social and environmental dimensions for South America, an econometric analysis is conducted. As other authors suggest, three econometric models can be conducted to study the effect of FDI on sustainable development. Thus, pooled ordinary least squares (OLS), fixed effects and random effects models are the most proper for the research study. The three econometric models will allow us to notice the difference that arrives when we ignoring individual-specific variation and unobserved heterogeneity random or time-invariant (Gujarati, 2003).

Moreover, to answer the second question of this research a descriptive analysis is followed. Figures are created with data of FDI by sector between 2008 to 2019. Additionally, figures are created with the arithmetical mean previous calculated for each sustainable dimension for each country. The figures allow the research to identify the difference performance between South America countries in foreign investment inflows and sustainable development scores. Thereby, this analysis will enrich the discussion in the following chapter.

4.3 Model Specification

Base on other studies applied for African countries to assess the influence of FDI on the three dimensions of sustainable development. The models are formulated to study the main research question (Martins et al., 2022):

$$ECO_{it} = \beta_{1it} + \beta_{2it} * FDI_{it} + \beta_{3it} * SOC_{it} + \beta_{4it} * ENV_{it} + \beta_{5it} * Population_{it} + e_{it} \text{ (I)}$$

$$SOC_{it} = \beta_{1it} + \beta_{2it} * FDI_{it} + \beta_{3it} * ECO_{it} + \beta_{4it} * ENV_{it} + \beta_{5it} * Population_{it} + e_{it} \text{ (II)}$$

$$ENV_{it} = \beta_{1it} + \beta_{2it} * FDI_{it} + \beta_{3it} * ECO_{it} + \beta_{4it} * SOC_{it} + \beta_{5it} * Population_{it} + e_{it} \text{ (III)}$$

Where i represents the country ($i=1, \dots, 9$), t represents the time index ($t=1, \dots, 12$), β_{k is the intercept, ($k=2, 3, 4, 5$) is the unknown parameters to be estimated corresponding to each explanatory variable of the model, FDI is the foreign direct investment net inflows (which is independent variable in the three models), Population is the population growth (control variable in the three models), and e_{it} is the error term. Moreover, ECO_{it} is the economic dimension score (dependent variable in Model III and control variable in Models I and II), SOC_{it} is the social dimension score (dependent variable in Model II and control variable in Models I and III), ENV_{it} is the environmental dimension score (dependent variable in Model I and control variable in Models II and III).

4.4 Limitations

One important point of clarification is that sustainability is impossible to measure directly, so any measure of “sustainability” is in reality a prediction of which characteristics of the system might ultimately be sustainable (Costanza et al., 2016). This cause a debate between academics about which are the best measures of sustainable development. However, there is a consensus that all countries in the world have to work to achieve sustainable development. Apart from that, there are two limitations that applied to this research.

No all indicators that measure sustainable development are available for all countries in South America. Additionally, many indicators have missing values for one or more years. Even though, the United Nations has to estimate many indicators to measure the sustainable index score for many developing countries in the sustainable report every year. All of these issues compromise the credibility of data to estimate the effect of FDI on sustainable development. These issues limit the period and quantity of indicators included to measure the economic, social and environmental dimensions. Further, the lack of data for FDI by sector delete the possibility to apply an econometric model for the second question. Which imply that the study cannot drive deeper conclusions in this scenario.

Finally, the indicators used to measure the SDGs can be group in different ways. Similarly, the SDGs used to calculate each sustainable dimension can be group differently depending on the framework. Which leads to a diverse result in the field of sustainable development. Therefore, in previous studies for developing or developed countries, we can find diverse results and conclusions. Which implies difficulty to understand which sustainable goal is driven causality to one determined dimension. Additionally, it is challenging to advice policies and strategies in the sustainable field. Even thought if the study finds significant results, the direction of causality between FDI and sustainable development is still a debate mainly for developing countries.

5. Empirical Results

This chapter presents the results of the research questions, which is divided in a descriptive analysis of variables, and followed by an analysis of the regressions results. At that point the reader will have a clear outlook of what is happening in South America. Then, to answer the second question this chapter offers an analysis of foreign investment by sector for each South America country.

5.1 Statistical description of Variables

Table 4 illustrates the properties of SDGs in South America during 2008 to 2019. The 12 SDGs drives diverse points of view of how the region is performing. Most of the SDGs have a mean above 0.5, except for the SDG12, SDG14 and SDG15 that have lower mean. While the standard deviation column (Std. dev) contains enormous values of the sample. Which means that each sustainable goal has a great difference performance in each country during the period studied. Thereby, we can argue that the scores of the sustainable goals are not clustered for South America countries.

Table 4 Statistical Summary of the 12 SDGs

Variable	Obs	Mean	Std. dev	Min	Max
SDG_2	108	0.59	0.25	0	1
SDG_3	108	0.54	0.14	0.22	0.82
SDG_5	108	0.54	0.29	0	1
SDG_6	108	0.51	0.16	0.2	0.8
SDG_7	108	0.59	0.23	0	1
SDG_8	108	0.51	0.12	0.18	0.73
SDG_9	108	0.51	0.16	0.17	0.96
SDG_11	108	0.50	0.25	0	1
SDG_12	108	0.46	0.19	0	0.97
SDG_14	108	0.41	0.22	0.19	1
SDG_15	108	0.48	0.31	0	1
SDG_17	108	0.53	0.21	0.11	0.82

Next, in Table 5 is illustrated the mean and standard deviation for economic, social and environmental dimensions. The mean for these variables is 0.51 economic dimension, 0.54 social dimension, and 0.50 environmental dimension. The standard deviation for the economic and social dimension is high which means the data is spread out between countries. Further, the standard deviation for the environmental dimension is lower than the two other dimensions, with a value of 0.08 in the sample. That value indicate that the environmental data is almost clustered tightly around the mean for South America. Additionally, FDI and Population have the higher standard deviation of all variables in Table 5. That means that FDI and Population data is spread out between the sample.

Table 5 Statistical Summary of sustainable dimensions

Variable	Obs	Mean	Std. dev	Min	Max
FDI	108	0.48	0.28	0	1
Economic	108	0.51	0.11	0.24	0.72
Social	108	0.54	0.12	0.24	0.74
Environmental	108	0.50	0.08	0.28	0.68
Population	108	0.47	0.31	0	1

Looking at the correlations between sustainable goals and FDI, it becomes visible that SDG2, SDG8, SDG17 are strongly correlated with FDI with a significance level of 10 percent (Table 6). Further, FDI has a negative correlation with SDG9, SDG11, and SDG15, which means that when one variable increases, the other variable decreases. Further, it is important to note that correlation does not imply causation between two variables. However, correlation can reveal multicollinearity which is a common feature for non-natural experiments (Gujarati, 2003).

Table 6 Correlation Matrix for SDGs, FDI, and Population

Variables	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)
(1) FDI	1.000													
(2) Population	-0.026 (0.792)	1.000												
(3) SDG_2	0.212* (0.027)	0.616* (0.000)	1.000											
(4) SDG_3	0.085 (0.379)	0.732* (0.000)	0.577* (0.000)	1.000										
(5) SDG_5	0.070 (0.472)	0.589* (0.000)	0.441* (0.000)	0.409* (0.000)	1.000									
(6) SDG_6	0.019 (0.845)	0.914* (0.000)	0.613* (0.000)	0.585* (0.000)	0.459* (0.000)	1.000								
(7) SDG_7	0.119 (0.220)	0.779* (0.000)	0.639* (0.000)	0.519* (0.000)	0.522* (0.000)	0.781* (0.000)	1.000							
(8) SDG_8	0.387* (0.000)	-0.085 (0.381)	0.190* (0.049)	0.130 (0.179)	0.223* (0.020)	-0.046 (0.634)	0.078 (0.420)	1.000						
(9) SDG_9	-0.003 (0.977)	0.496* (0.000)	0.248* (0.010)	0.368* (0.000)	0.132 (0.174)	0.486* (0.000)	0.555* (0.652)	-0.044 (0.652)	1.000					
(10) SDG_11	-0.032 (0.742)	0.869* (0.000)	0.518* (0.000)	0.729* (0.000)	0.563* (0.000)	0.710* (0.000)	0.652* (0.000)	0.051 (0.603)	0.501* (0.000)	1.000				
(11) SDG_12	0.040 (0.678)	-0.400* (0.001)	-0.302* (0.000)	-0.364* (0.000)	-0.189* (0.050)	-0.318* (0.001)	-0.304* (0.001)	0.077 (0.428)	-0.256* (0.007)	-0.404* (0.000)	1.000			
(12) SDG_14	0.002 (0.988)	0.359* (0.000)	0.305* (0.001)	0.223* (0.021)	-0.050 (0.607)	0.437* (0.000)	0.268* (0.005)	-0.080 (0.413)	0.184 (0.057)	0.236* (0.014)	-0.356* (0.000)	1.000		
(13) SDG_15	-0.150 (0.121)	-0.508* (0.000)	-0.706* (0.000)	-0.463* (0.000)	-0.167 (0.085)	-0.499* (0.000)	-0.438* (0.000)	0.026 (0.793)	-0.084 (0.388)	-0.457* (0.000)	0.389* (0.000)	-0.516* (0.000)	1.000	
(14) SDG_17	0.194* (0.045)	0.829* (0.000)	0.659* (0.000)	0.702* (0.000)	0.594* (0.000)	0.819* (0.000)	0.713* (0.000)	0.399* (0.000)	0.435* (0.000)	0.726* (0.000)	-0.304* (0.001)	0.311* (0.001)	-0.437* (0.000)	1.000

*** $p < 0.01$, **
 $p < 0.05$, * $p < 0.1$

The correlation between FDI and the three dimensions of sustainable development is weak and is not significant at 5 percent level (Table 7). This may be an indication that the foreign investment can positively influence the sustainable dimensions. Population presents a negative correlation with FDI but it is nonsignificant, and a positive significant correlation with the three sustainable dimensions. However, the correlation between economic, social and environmental is high in the sample, but do not exceed the critical value. Except, for the correlation between social and economic dimensions which is more than 0.8 and is significant. This is not surprising, as each SDG contribute to calculate more than one sustainable dimension. Thus, in this scenario we do not take seriously the multicollinearity between social and economic dimension.

Table 7 Correlation Matrix of Sustainable Dimensions, FDI and Population

Variables	(1)	(2)	(3)	(4)	(5)
(1) FDI	1.000				
(2) Population	-0.026 (0.792)	1.000			
(3) Economic	0.146 (0.131)	0.853* (0.000)	1.000		
(4) Social	0.165 (0.088)	0.798* (0.000)	0.849* (0.000)	1.000	
(5) Environmental	0.028 (0.773)	0.648* (0.000)	0.709* (0.000)	0.700* (0.000)	1.000

*** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$

The relationship between the three dimensions confirms the theoretical framework used to formulate the methodology. Base on Costanza et al. (2016), the three dimensions share some common goals of sustainable development. Moreover, in previous studies, there is evidence that the three dimensions possess a high correlation. For example, in Martins et al. (2022) research, the three dimensions of sustainable development have high correlation values.

5.2 Analysis of the results

Table 8 contains the results of the three econometric models that estimate the effect of FDI on economic, social and environmental dimensions in South America. Model I estimate the effect of foreign investment on economic. The results are positive and significant at 5 percent level in the three types of regression applied. The effect can be interpreted as a 1-point increase in foreign investment leads to 0.038-point increase in the economic score when the regression is pooled OLS and the same with random effects. For fixed effects, 1-point increase in foreign investment leads to 0.052-point increase in the economic score with a significance level of 98 percent. Moreover, fixed effect estimations sustain a higher effect and significance level than the other two regressions. The R squared is the same for three regressions, and has a value of 0.82 which means that the model is accurate.

Then, Model II estimates the effect of foreign investment on social dimension. Overall, the results of this model are positive and significant at 5 percent level. Again, as in the model I, the results of the pooled OLS and the random effects are the same for the dependent variable. Thus, 1-point increase in foreign investment leads to 0.043-point increase in the social score. While the effect is larger with fixed effects; 1-point increase in foreign investment leads to 0.049-point increase in the social score for South America. Additionally, the R squared is the same for three regressions with a value of 0.76. However, the R squared of this model is lower than the R

squared of the Model I. In this case, the prediction of the effect of FDI on economic dimension is better than the prediction of the effect of FDI on social dimension.

Finally, the Model III shows the effect of foreign investment on environmental dimension. The three regressions demonstrate a negative effect of foreign investment on environmental score for South America. Nevertheless, any of the three regressions are significant at 5 percent level. Which lead to argue that other variables can explain the score of the environmental dimension in this region. Furthermore, the R squared of these three regressions are lower than the R squared in Model I and Model II. Model III possess a R squared of 0.54 which remain the same in three types of regressions.

Table 8 Regression Results for Economic, Social and Environmental Dimensions

Dependent Variable	Pooled OLS	Fixed Effects	Random Effects
Economic			
FDI	0.038* (2.32)	0.052** (3.03)	0.0383* (2.28)
Social	0.307*** (4.41)	0.253*** (3.48)	0.307*** (4.28)
Environmental	0.199** (2.76)	0.207** (2.65)	0.199** (2.63)
Population	0.169*** (7.26)	0.183*** (6.96)	0.169*** (6.75)
Cons	0.146*** (4.22)	0.158*** (4.46)	0.146*** (4.33)
R ²	0.82	0.82	0.82
R ² Within	--	0.84	0.84
R ² Between	--	0.49	0.59
N	108	108	108
Social			
FDI	0.043* (2.12)	0.049* (2.09)	0.043* (2.00)
Economic	0.492*** (5.46)	0.447*** (3.48)	0.492*** (4.28)
Environmental	0.260** (2.65)	0.234* (2.23)	0.260** (2.73)
Population	0.113*** (3.83)	0.135** (3.32)	0.113** (3.08)
Cons	0.0867 (1.92)	0.110* (2.18)	0.086 (1.90)
R ²	0.76	0.76	0.76
R ² Within	--	0.77	0.77
R ² Between	--	0.54	0.6
N	108	108	108
Environmental			
FDI	-0.027 (-1.24)	-0.024 (-1.05)	-0.025 (-1.17)
Economic	0.317* (2.46)	0.332** (2.65)	0.327** (2.72)
Social	0.258* (2.60)	0.213* (2.23)	0.231* (2.49)
Population	0.003 (0.10)	0.016 (0.41)	0.011 (0.29)
Cons	0.214*** (5.66)	0.223*** (5.13)	0.219*** (5.21)
R ²	0.54	0.54	0.54
R ² Within	--	0.57	0.57
R ² Between	--	0.21	0.23
N	108	108	108

Notes: t statistics in parentheses

* p<0.05, ** p<0.01, *** p<0.001

5.3 Analysis between South America Countries

In the region, the data shows that the economic, social and environmental dimensions have a positive change during 2008 to 2019 (Figure 3). A surprising result is that the social dimension is the best performing dimension in the region with the highest score at 2019. The economic and environmental dimension growth and decline over the period. But overall ends with a better score in the 2019 versus 2008. On the other hand, FDI has a scandalous unstable pathway during the same period in this region (Figure 4). Indeed, after 2009, foreign investment increases tremendous. Then, since 2013 foreign investment is decreasing in the region.

Figure 3 Sustainable Development Dimensions between 2008 to 2019

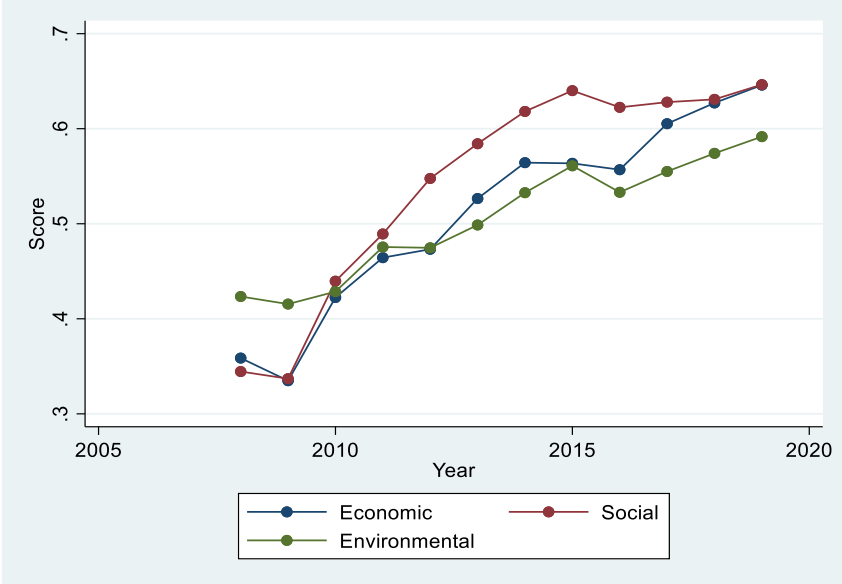
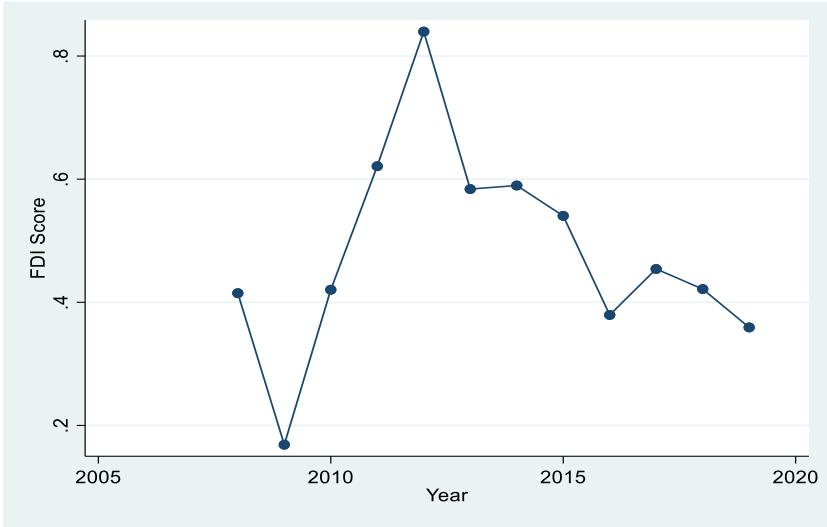


Figure 4 FDI Scores between 2008 to 2019



However, Figure 5 illustrates that each country has a different performance in this period. Which is understandable because each country priorities specific policies, strategies and sectors to promote sustainable development. Argentina, Brazil, Chile, Peru and Uruguay are countries that improve enormously their social dimension. While Colombia, Ecuador, and Paraguay have a better performance in the economic dimension. Lastly, Bolivia is the only country that have a relevant growth in the environmental dimension score.

Similarly with foreign investment, each South America country display a different pathway during this period (Figure 6). Generally, all countries show periods where foreign investment reach unprecedent higher levels, and other years where FDI has the lower levels. Argentina, Paraguay and Uruguay are clear examples of unstable FDI scores during the period. Nevertheless, Brazil and Colombia are exceptional countries in this region, maintaining a stable level of foreign investment since 2015.

Figure 5 Heterogeneity between Countries in sustainable development dimensions (2008 vs 2019)

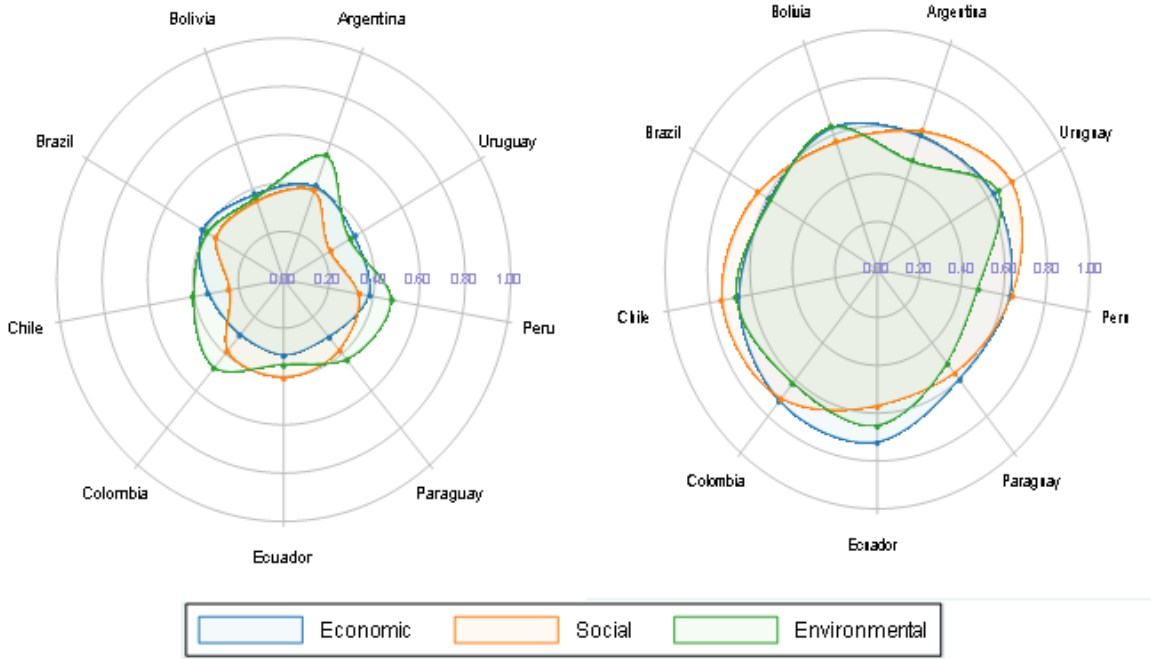
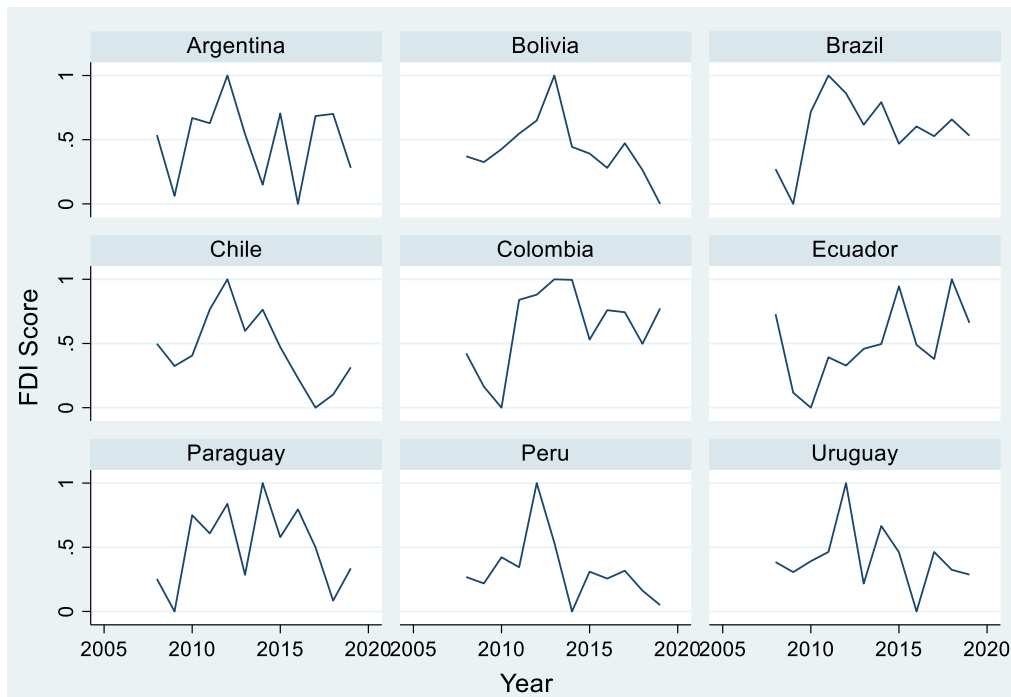


Figure 6 Pathway of foreign investment in South America countries



5.3.1 Argentina

Argentina is a country that improve in the economic and social scores during the period studied (Figure7). While the environmental dimension displays a deplorable performance after 2008. This reveals low priority to environmental concerns of the country. As regards to the foreign investment, Figure 8 shows in this country increases investment in the service and manufacture sectors until 2015. Since 2016, this country lack of official data for foreign investment by sector. However, the foreign investment report for Latin America in 2022. ECLAC (2022a) mentioned that foreign investment increased in relevant industries related to the service and natural resource sectors.

In the service sector major projects in telecommunications attract foreign investors, which can lead to a positive performance of economic and social dimensions. While the increasing foreign investment in oil and lithium industries can decrease the environmental scores. When foreign investment increase in natural resources, the environmental score decreases, for example in 2013 and 2015 years. Furthermore, this country is working with foreign investors in projects to implement clean energy, focusing to construct infrastructure to exploit renewable energy sources (ECLAC, 2021b) (ECLAC, 2022a). Nevertheless, Argentina is a country that in the last years face macroeconomic issues and challenges that discourage foreign investment (ECLAC, 2022a).

Figure 7 Argentina Sustainable Development Pathway

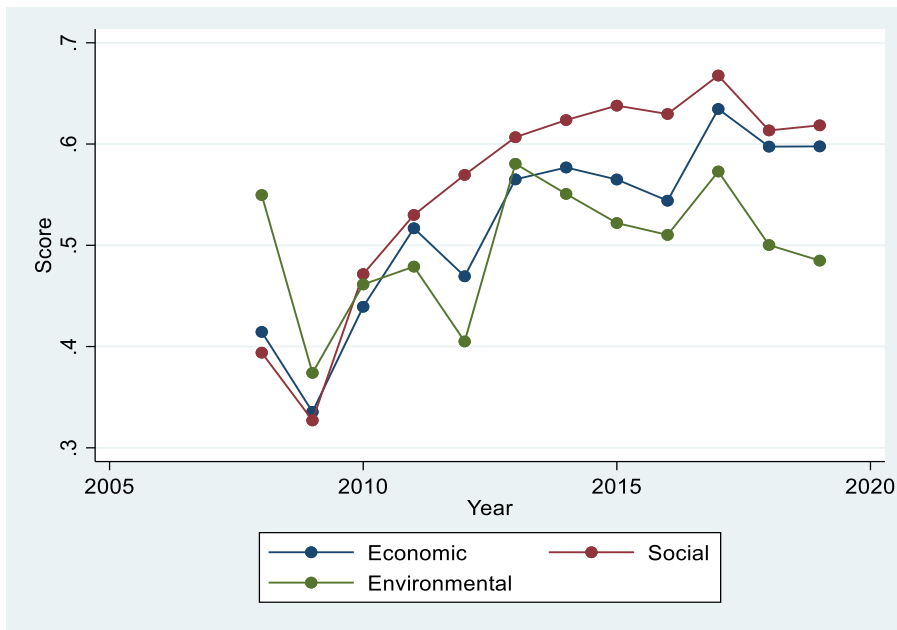
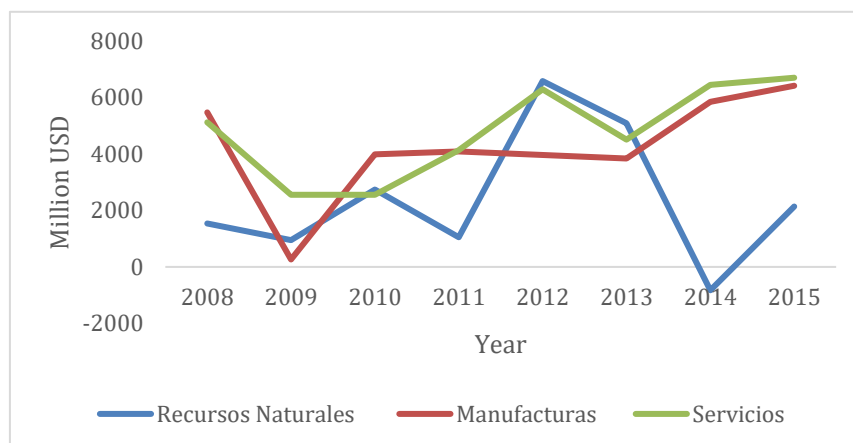


Figure 8 Argentina Foreign Investment by Sector



5.3.2 Bolivia

Figure 9 shows that the economic score increases during 2008 to 2019. On the other hand, environmental and social scores present an unstable pathway of growth. However, all dimension scores are better at the end of 2019 compared to the 2008. Furthermore, Bolivia is one of the South America countries where foreign investment is concentrated in natural resources. Figure 10 illustrates that in the studied period, natural resources investment takes the leadership, except in 2016 when the service sector positioned with the highest amount of FDI.

Bolivia is a remarkable example that when foreign investment predominates in natural resource sector, the environmental score declines which means environmental degradation. However,

since 2016, this country improves in the environmental dimension, which may be reflect the country concerns for environmental conservation. Indeed, in the last two years is evident a drastically FDI decrease in natural resources, and immediately increases the environmental scores. Additionally, this country illustrates that the social score growth, even though the foreign investment is concentrated in natural resources.

Figure 9 Bolivia Sustainable Development Pathway

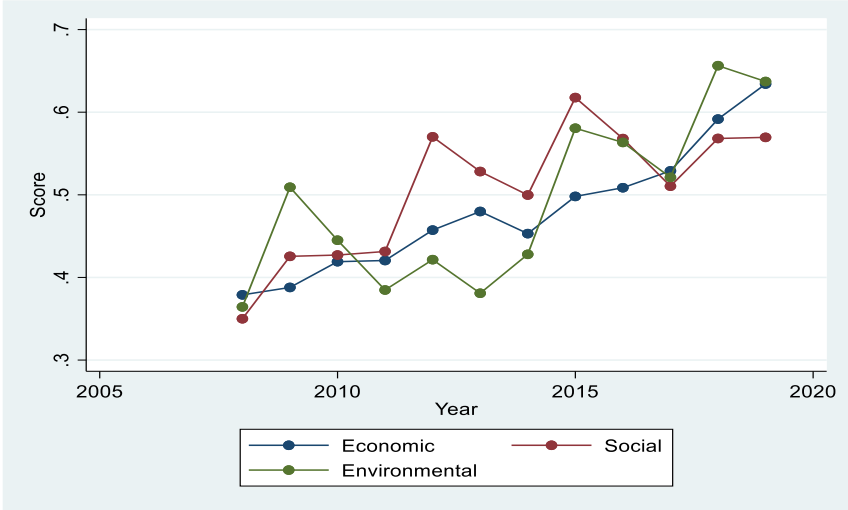
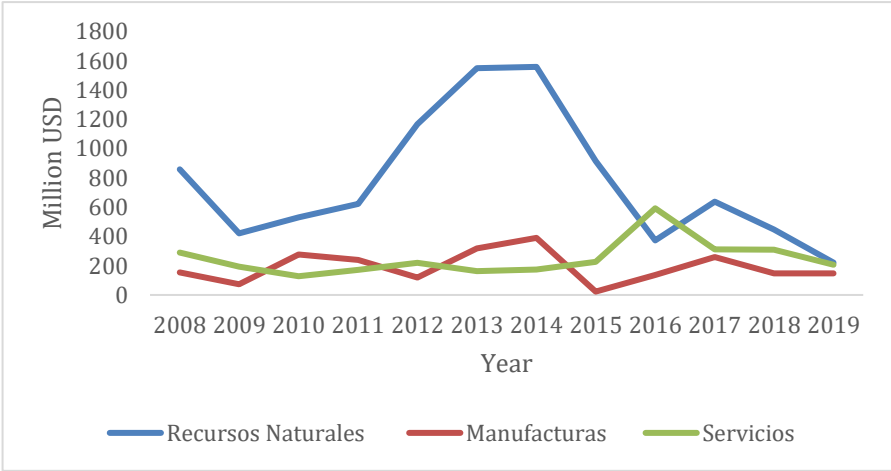


Figure 10 Bolivia Foreign Investment by Sector



5.3.3 Brazil

Brazil is a country that improve in all sustainable dimensions during 2008 to 2019 (Figure 11). Mainly the social dimension is the one that change considerably; started with the lower score in 2008 and ended with the higher score at 2019. Then, followed by good performance of the environmental and economic dimension. Furthermore, this country is an excellent example of growth in service sector, meanwhile, the foreign investment in natural resources is stagnated

(Figure 12). This can reflect the incentives of the country to promote investment in more technological, complex, and advance sectors of the economy (UNCTAD, 2022).

The manufacture sector is the biggest sector to attract foreign investors due to the incentives and subsidies the government promote (ECLAC, 2022a). Thus, Brazil has the most competitive international industries in the region. This country illustrates that foreign investment in the manufactured can impulse economic and social growth. The data reveal that the manufactured sector investment follows the same trail of the economic dimension scores during this period. Additionally, Brazil is a remarkable example of sustainable development. This country is taking advantage of their natural resources to promote foreign investment. Indeed, this country is promoting investment in renewable energy which let this country impulse the score of the environmental dimension (ECLAC, 2021b) (ECLAC, 2022a).

Figure 11 Brazil Sustainable Development Pathway

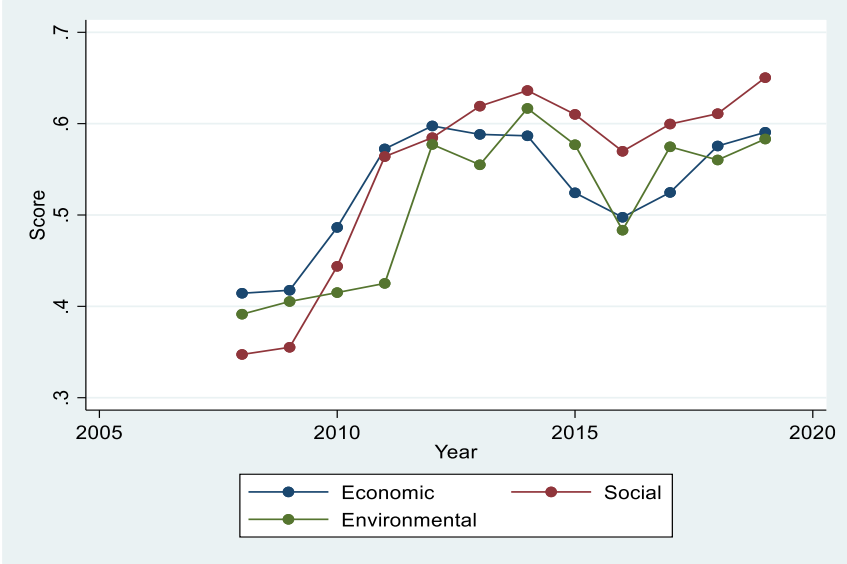
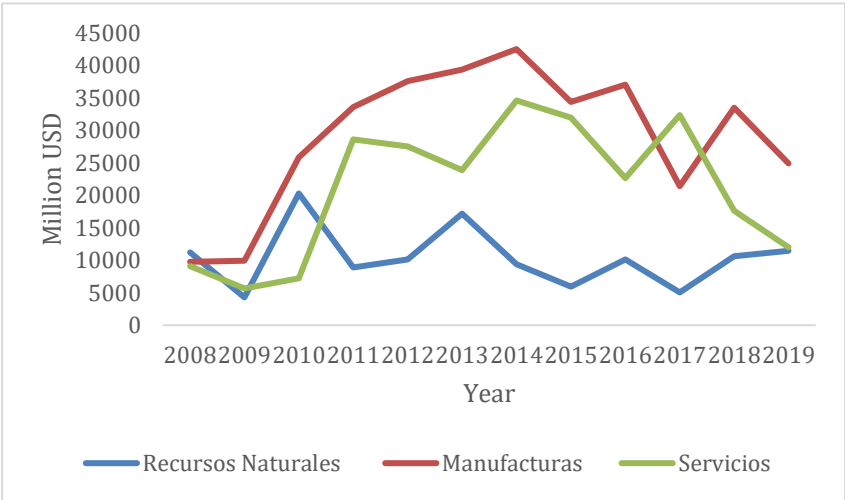


Figure 12 Brazil Foreign Investment by Sector



5.3.4 Chile

Figure 13 illustrates Chile path in sustainable development between 2008 to 2019. The social dimension is the sustainable dimension which have the greatest improvement in this country. Nonetheless, the economic and environmental dimension also display a positive growth during this period. Moreover, Figure 14 shows that the service sector occupies the first place for foreign investment in this period. Even though Chile is one of the countries which maintain a relevant amount of foreign investment in natural resources.

The country may encourage the natural resources investment while taking care of the environmental concerns. Mainly the county promotes investment in the energy industry, but focusing of renewable energy which attract foreign investors (ECLAC, 2021b). Thus, even though the investment goes to natural resources the environmental score does not decrease. Additionally, the economic and social dimension can be benefit of the foreign investment in natural resource sector. Which could be the case because data shows that both dimensions scores increase during this period. Furthermore, the leadership of service sector investment may influence the performance of the three sustainable dimensions.

Figure 13 Chile Sustainable Development Pathway

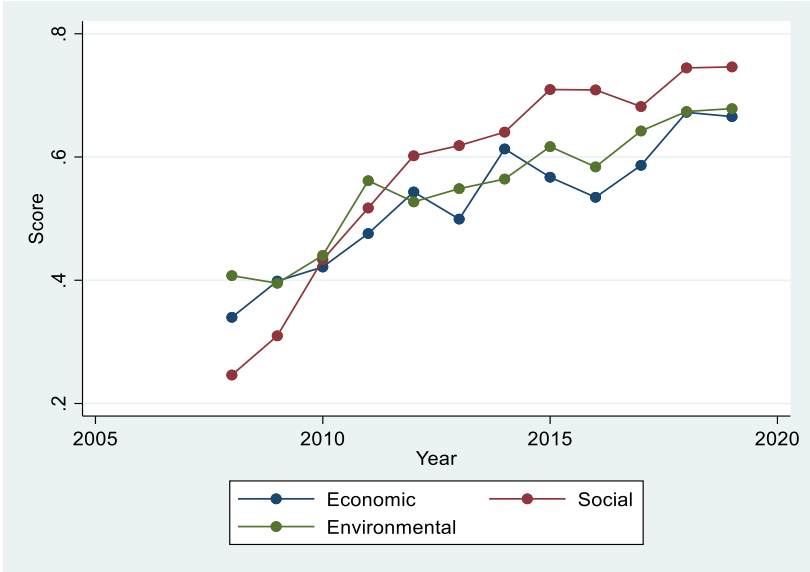
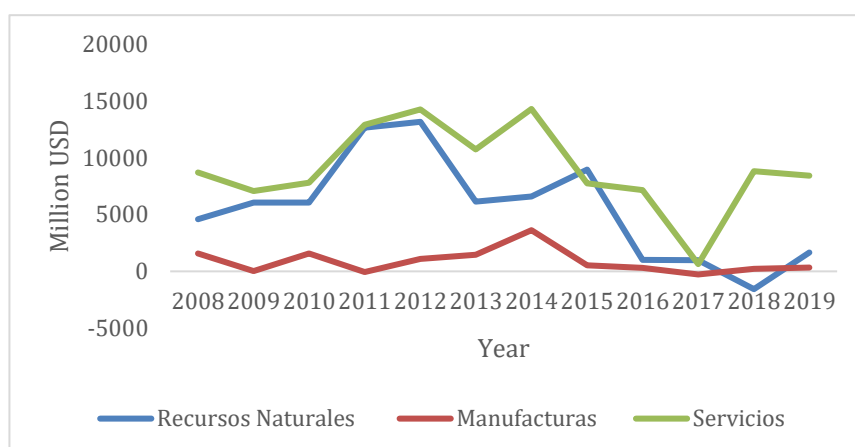


Figure 14 Chile Foreign Investment by Sector



5.3.5 Colombia

Figure 15 illustrates that all sustainable dimensions improved the score during 2008 to 2019. The concerns and strategies of the country to promote sustainable development. Moreover, Figure 16 shows how change the destination of foreign investment in this country. Until 2014, natural resources sector leads the foreign investment sectors, followed by service sector and manufactured sector. But since 2015, the service sector takes the first place, then natural resource sector and manufactured sector. Colombia is another country of the region where foreign investment increase in the service sector.

The most relevant participation of investment in the service sector go to telecommunication and financial services (ECLAC, 2022a). Which can positively contribute to the improvement of the tree dimensions of sustainable development. When the foreign investment increase in the service sector improves the scores of the social and economic dimension. Additionally, when the foreign investment decrease in natural resources since 2014, increase the score of the environmental dimension. This is mainly because foreign investment in natural resources goes to oil exploitation and mining extraction, instead of renewable energy as in other countries in the region (ECLAC, 2021b).

Figure 15 Colombia Sustainable Development Pathway

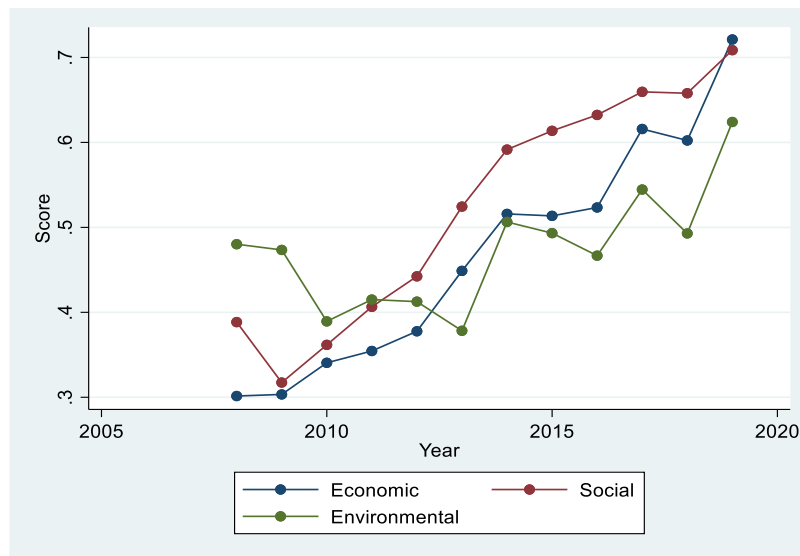
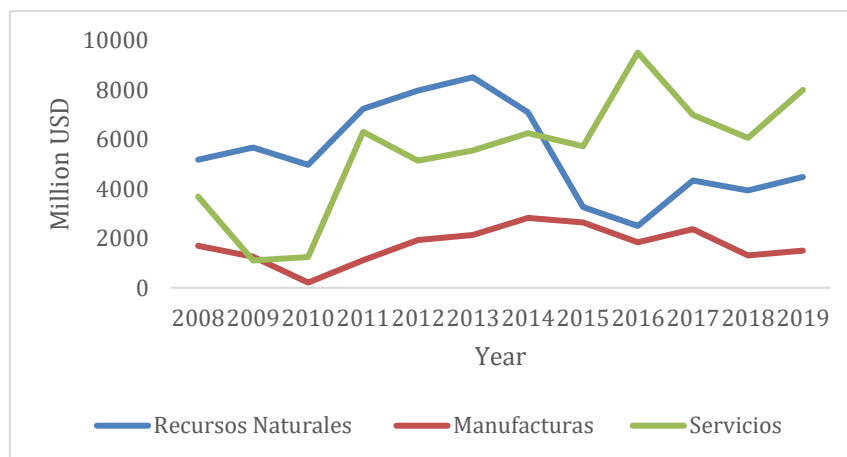


Figure 16 Colombia Foreign Investment by Sector



5.3.6 Ecuador

Ecuador manages to improve the scores in all three dimensions of sustainable development. The three dimensions scores start to increase after 2009, and ended with better scores at the end of 2019 (Figure 17). Furthermore, Ecuador is one of the countries where the natural resources investment keeps strong during 2008 to 2019. Figure 18 shows that since 2010 foreign investment in natural resources dominate. Which exposes that the country is promoting investment in natural resource sector.

Since 2015, the social and environmental scores start to decline. At the same time, the natural resources investment increase. Which can let argue that the investment in this sector may influence the social and environmental scores. Besides the environmental degradation, this type of foreign investment can impact negatively in the society. Usually, the foreign investment in

natural resources goes to oil and mining extraction which create conflicts with the local communities (Delgado & Hernandez, 2022). However, the natural resource investment contributes to a great performance of the economy (Vogt et al., 2021).

Figure 17 Ecuador Sustainable Development Pathway

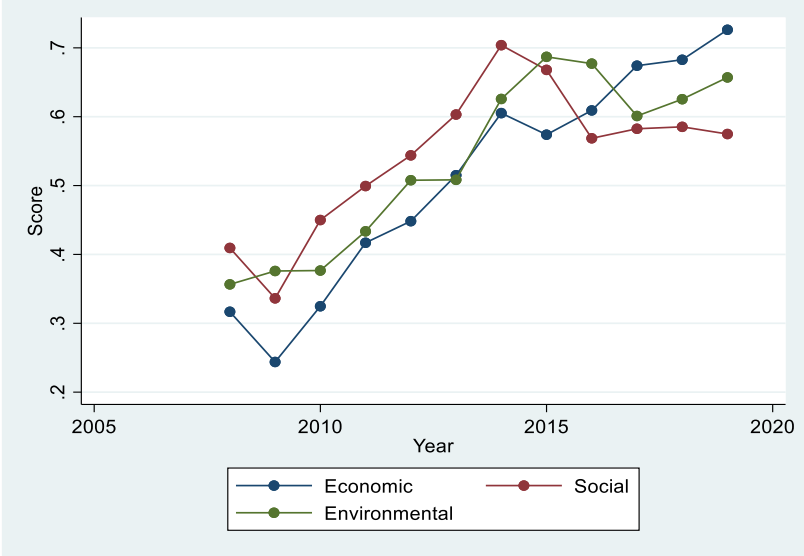
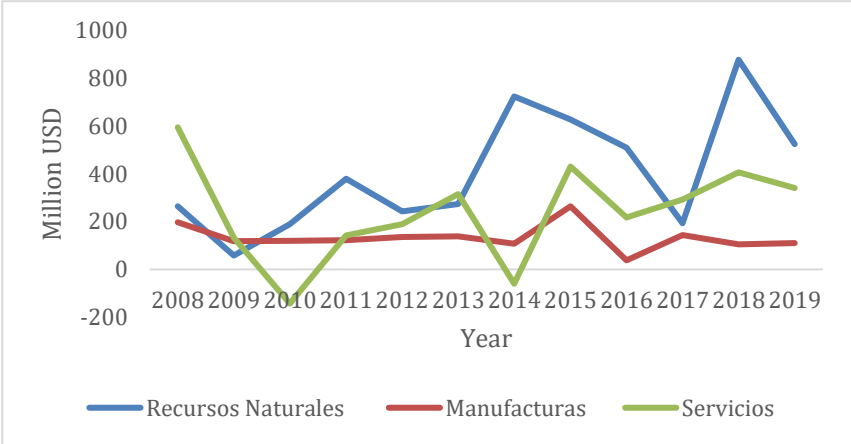


Figure 18 Ecuador Foreign Investment by Sector



5.3.7 Paraguay

Figure 19 shows that economic and social scores increased during the period 2008 to 2019. While the environmental score increases but not as much as the other two dimensions. This reflects that the government focus on the strategies that promote economic and social development. Furthermore, Figure 20 illustrates that Paraguay receives a relevant amount of foreign investment in the service and manufactured sectors. Mainly between 2010 to 2016, the service sector leads the foreign investment in the country. Meanwhile, the foreign investment in natural resources is not dominant in this country which is an exceptional case in this region.

The environmental scores do not change significantly during this period. Thus, it can be argued that is due to the fact that foreign investment in natural resources is not a leading sector. Moreover, the great performance of foreign investment in service sector can lead to positive change in economic a social dimension. Mainly the pathway of the social scores and the foreign investment in service sector is similar in this period. Additionally, when the foreign investment increases in the manufacture sector, the social score increases.

Figure 19 Paraguay Sustainable Development Pathway

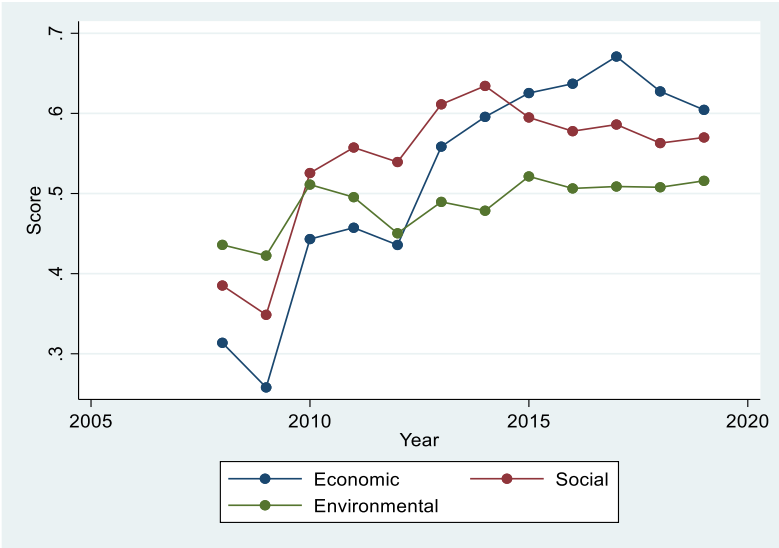
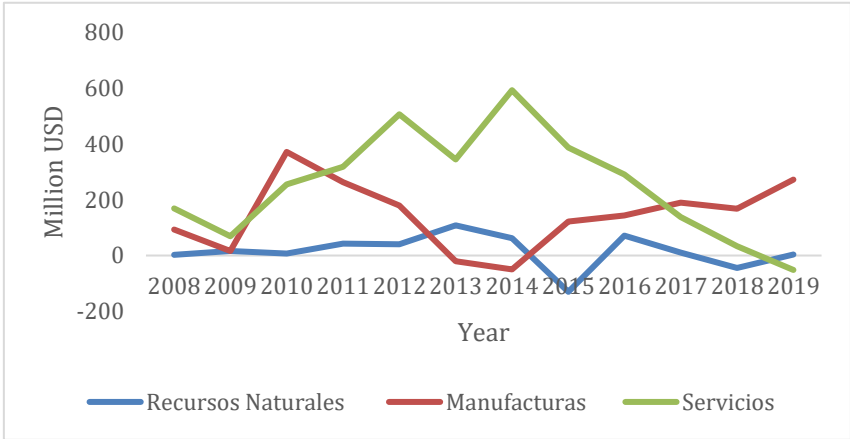


Figure 20 Paraguay Foreign Investment by Sector

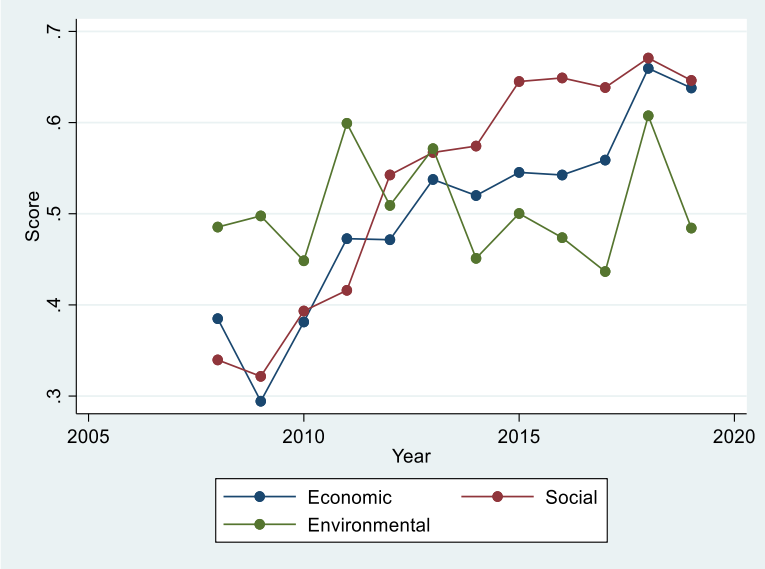


5.3.8 Peru

Figure 21 illustrates that Peru improve their performance in the economic and social dimension. However, this is the only country in South America, which has a worst score in the environmental dimension at the end of 2019. This clearly reveals that the country is not

prioritizing concerns and strategies related to the environmental conservation. Moreover, unfortunately, the country lack of data available of foreign investment by sectors. However, in the foreign investment report for Latin America, ECLAC (2022a) explains that Peru receives a relevant amount of foreign investment in natural resources and service. Most of the foreign investment is located in industries related to mining, construction, and telecommunication (ECLAC, 2021b). Indeed, the mining sector is one of the leading sectors of foreign investment (ECLAC, 2022a). Thereby, it is possible to understand that if mining is leading the foreign investment, the environmental dimension is the most affected negatively.

Figure 21 Peru Sustainable Development Pathway



5.3.9 Uruguay

The scores indicates that Uruguay perform positively to improve the conditions in the three dimensions of sustainable development (Figure 22). Especially the social dimension is one of the best scores in the region at 2019. The environmental dimension has better score than the economic dimension which suggests that the country gives relevance to environmental concerns. Moreover, Figure 23 illustrates that the foreign investment in the service sector leads until 2016, and recovery in 2019. Then, the manufactured sector is in the second sector that receives more foreign investment.

In the country, the foreign investment in the service sector goes to technological information projects. Which can lead to improve the economic and social dimension and influence positively the environmental dimension. However, in 2016 when the foreign investment in service sector decreases drastically, the economic dimension is the most affected by declining the score. Additionally, the low investment in natural resources extraction allow this country to improve the environmental score (ECLAC, 2022a).

Figure 22 Uruguay Sustainable Development Pathway

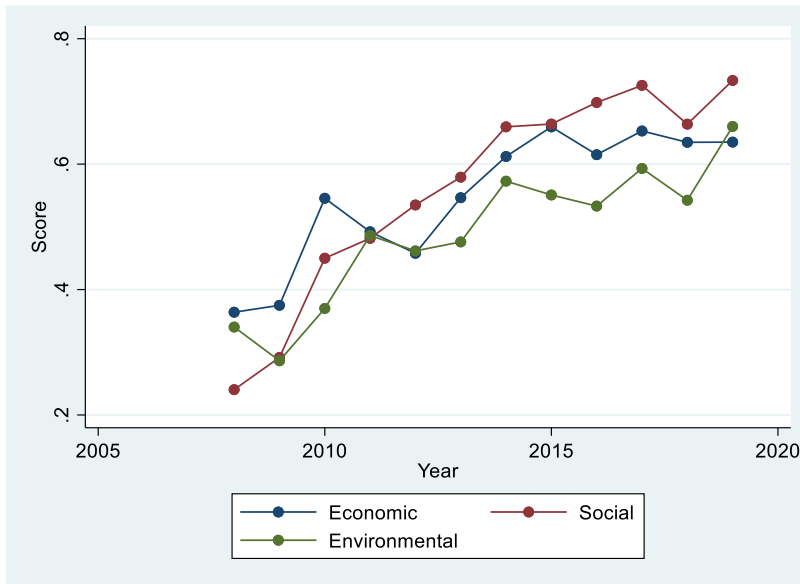
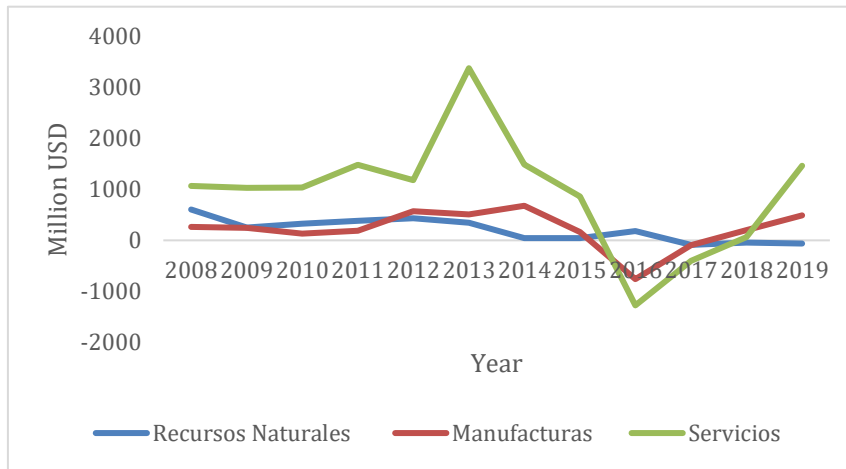


Figure 23 Uruguay Foreign Investment by Sector



6 Discussion and Implications

This chapter discusses the results of the econometric analysis and descriptive analysis of each country. Additionally, the previous literature will help to elaborate this discussion. The results are compared to previous studies and possible underlying similar results.

The main research question refers to the influence of FDI on the three dimensions of sustainable development in South America. First of all, we find a positive and strong correlation between the dimensions. So, if one dimension improve, can encourage development in another dimension. Which implies that sustainable development will be achieved when the three dimensions improve in the region. The three regressions (pooled OLS, fixed effects, and random effects) drive similar results in each sustainable dimension. Foreign investment has a positive and significant impact on economic and social dimensions in this region. While in the environmental dimension, we find a negative and nonsignificant result. This alerts that Model I and Model II are more robust for estimating the social and economic scores. The results provide a great panorama of how is performing South America between 2008 to 2019. However, the estimations are not sufficient to conclude that FDI care about sustainable development in South America countries.

For the first question, Model I analyses FDI influence on the economic dimension. In South America, foreign investment has a positive effect on the economic score with a significance of 5 percent with OLS and random effects. While with fixed effects the significance increases to 1 percent. The results of the Hausman test confirm that fixed effect estimations are more accurate (Appendix B). That means that our sample has unobserved heterogeneity between countries that is not random. The results follow Martins et al. (2022) findings for African countries. Additionally, follows the framework that foreign investment covers the financial deficit gap and promote spillover knowledge. To encourage economic growth in the domestic country. However, it should be considered that FDI represents around 2 or 3 percent of the GDP in South America countries. Therefore, the effect of economic growth will depend to which industry is focused and which linkages stimulate with other industries in the economy.

The second question is about the effect of foreign investment on the social dimension. Model II demonstrates a positive effect on the social score with a significance of 5 percent in the three regressions. In this scenario, Hausman test suggest that random effects are more appropriate to estimate this model (Appendix B). That means the unobserved heterogeneity between countries is random in the sample. These findings suggest that FDI create employment which alleviate poverty and improve living standards. However, for this question is difficult to drive conclusions due to FDI mainly indirectly affects the social dimension. Moreover, for South America, ODA and blended finance are tools that probably encourage more social development. Furthermore, previous studies find a negative effect of foreign investment on social dimension for developing countries (Martins et al., 2022). Therefore, the estimations shows that FDI increase social scores, but is unknow through which channel influence social development in the region.

For the third question, Model III estimates the effect of foreign investment on environmental dimension. Although the results are nonsignificant, we can argue relevant points of the research.

If FDI is focused on natural resources extraction, we can expect similar results as the findings in other developing countries. For example, Martins et al. (2022) find that in African countries, FDI has a negative effect on the environmental dimension because it is usually concentrated in mining. However, if the FDI is focused on greener or sustainable projects. As the literature explains there could be positive effects because foreign investment brings best management practices and advances technology to the host country (Aust et al., 2020). However, with nonsignificant results we cannot formulate an appropriate inference for the environmental dimension in South America.

South America is notably a region that is working to achieve sustainable development. All three sustainable scores increased during 2018 to 2019. Similarly, foreign investment inflows grew in the region. However, the positive effect in each dimension could not be FDI mainly responsible. We cannot forget that ODA has a relevant participation to promote development in developing countries, especially in the social and environmental dimensions. Moreover, it is important to understand that not all sectors in the economy encourage sustainable development. If FDI promotes sustainable development, it should focus on the driven sectors of sustainable development. For example, renewable energy, digitalization, health, bioeconomy, and others. Therefore, the descriptive analysis of FDI by sector and sustainable development per country let illustrate a deeper panorama of the region. Although causality cannot be proven with this method.

In the descriptive analysis, we find diverse outcomes for South America. In four out of nine countries, FDI is focused on natural resources (Bolivia, Colombia, Ecuador, and Peru). Then, in four countries (Argentina, Chile, Paraguay, and Uruguay) led the foreign investment in the service sector. Lastly, Brazil is an exceptional case where FDI is concentrated in the manufactured sector during the whole period. Indeed, each type of foreign investment will affect differently the sustainable dimensions. Moreover, it reflects the government interest to promote or discourage foreign investment in one determined sector.

Countries focused with foreign investment inflows on natural resources are expected to have the worst performance of sustainable development. In the sample, all countries have a better score in the economic and social dimension at the end of 2019. However, the environmental score is lower than the other two scores for Colombia and Ecuador. Radically for Peru, the environmental score is lower in 2019 than in 2008. This reflects that FDI on natural resources may improve the economic and social dimension while increase environmental degradation in the host country. Previous studies of less developed countries follow this scenario, for example in African countries (Aust et al., 2020). Moreover, this reflects the weak policies and strategies of South America countries to encourage laws to protect the ecosystem and biodiversity. The literature names this effect as the pollution haven hypothesis where FDI carries pollution to the host country. Nevertheless, one country shows the opposite effect of the three countries above. Bolivia has a greater score of the environmental dimension in 2019 and is above the economic and social scores. Indeed, Bolivia is an example of the pollution halo hypothesis where FDI brings best management practices to improve the environment conservation. Additionally, it shows that Bolivia is working to endorse environmental conservation.

Then, Argentina, Chile, Paraguay, and Uruguay receive foreign investment concentrated in the service sector. Countries with higher investment in service sector shows to have a higher score in the economic, social and environmental dimension. Specially the score of the social dimension is higher for these countries. On one hand, this evidence shows different results than in African countries where FDI influence negatively the social dimension. On the other hand, this finding shows that the service sector is relevant for social development in the region. Maybe the service sector brings new technology and creates employment which is suitable for sustainable development. Additionally, the service sector can build infrastructure that improve the living standards of the population. However, we lack of data to assure how service sector works in sustainable development. But this evidence is an interesting point to start for further research in the region.

Brazil is a unique example where predominates the foreign investment in the manufactured sector in South America. Although followed closer by foreign investment in the service sector. This illustrates the government efforts to create a more competitive economy to attract foreign investment in more complex sectors. Regarding sustainable development, the country has a higher score in the social dimension, then followed by economic and environmental dimensions. The literature explains that the investment in the manufactured sector foster strong linkages with other industries in the economy to promote economic growth (Gallagher et al., 2009). Moreover, this country benefits of foreign investment in the service sector. As mentioned earlier service sector is considered a dynamized sector that promote social development. Therefore, we can argue that foreign investment in the manufactured and service sector help this country to promote sustainable development. Nevertheless, this does not mean that investment in natural resource is inefficient to push sustainable development. For example, (Cordero, 2022) explains that if the foreign investment in natural resources goes to renewable energy projects, FDI encourages sustainable development.

These results contribute to the current debate in developing countries. However, the results of the research are not enough to drive an appropriate conclusion for South America. The lack of data limited to calculate five SDGs that are relevant for the study of the relation between FDI and sustainable development. For example, the SDG 13 is one that may affect the nonsignificant result of environmental dimension. Additionally, missing values of SDGs can bias the results obtained. For further studies if should be consider to use other data bases to calculate the missing SDGs. Moreover, the study ignores that South America is one region with countries which have different economic, social, and environmental characteristics. For example, even though Brazil receives the greatest amount of foreign investment in the region, it is not the country with major amount of FDI per capita. The size of the economy and other characteristics affects the implication of the results. For precise information it should be analyzed each country separately. Furthermore, lack of data by sector limited the understanding of which sectors drives sustainable development in the region. For future studies in the region, it would be interesting to study individually each country to have a deeper understanding.

In spite of these limitations, these results are a smart guideline of what is happening in the field of foreign investment and sustainable development in South America. This study has important policy implications for the region. Foreign investment is a source of economic growth and social development. Policies should focus to attract more foreign investment for manufactured and service sectors. Avoid the concentration in one sector is also require, therefore the region

should diversify the investment in all sectors of the economy. Nevertheless, South America requires to enforce law and controls to avoid environmental degradation. Additionally, strategies may focus to foreign investment that bring advance technology, good practices, ensure human rights, and develop infrastructure require for sustainable development. Technology appears to be a key factor for all sustainable dimensions, so governments should encourage new technology implementation. Finally, the region has to avoid political instability and corruption to establish a favorable investment environment.

7 Conclusions

Sustainable development rise awareness in developed and developing countries since 2008. The climate crisis effects alert the United Nations to call for an action of all countries to avoid devastating effects globally but especially in poor countries. Thus, emerge seventeen SDGs that need to be achieve in the 2030 by developed and developing countries. The SDGs are based on the idea of balance between economic growth, social development and environmental conservation. To achieve the SDGs in 2030, developing countries face a main barrier that is lack of financial sources. Additionally, ODA demonstrates to be an inefficient tool to encourage sustainable development in the long term.

The growing concerns of lack of financial sources and inefficient international assistance in developing countries risen the attention of economists on FDI as a source to push sustainable development. The literature review reveals a notably debate between positive and negative impacts in the three dimensions of sustainable development. In the economic dimension, FDI can promote economic growth but can generate unfair competition or wipeout local firms. In the social dimension, FDI create employment that indirectly alleviate poverty or can discourage human capital formation and human rights. While in the environmental dimension, foreign investment can bring positive externalities or negative externalities which improve or hinder the environment. Moreover, in previous studies for developing countries it is find that FDI promote economic growth. But it is a debate if FDI clearly improve social and environmental dimensions.

South America stands out with a clear issue of lack of financial sources to encourage sustainable development. ECLAC (2022) mentioned in the last report of foreign investment for this region, FDI is a source to push sustainable development. Moreover, South America shows growing foreign investment inflows and sustainable development score at 2019. However, since 2000s, this region is well known for receive foreign investment in natural resources exploitation. Thus, is relevant to analyze if foreign investment positive influence sustainable development. Additionally, the main contribution of this study is to supply with research that focus in three dimensions of sustainable development at the same time.

For a panel of nine South America countries, foreign investment inflows, population growth and 106 indicators of sustainable development were chosen to investigate the influence of foreign investment on the sustainable development. The period studied was between 2008 to 2019 due to the availability of data. First of all, the data shows a strong correlation between the three dimensions which implies that improve in one dimension can help to improve another dimension. Which according to the literature is a basic condition to achieve sustainable development.

Then, OLS, fixed effect and random effect regressions were runned to find the following results. Foreign investment has a positive a significant impact on the economic and social dimensions. While foreign investment shows a negative a nonsignificant effect on the environmental dimension. This implies that FDI is an important source to increase the scores of the economic and social dimensions in the long run. Although we cannot conclude that FDI encourage sustainable development in South America.

Besides, a descriptive analysis was conducted to understand which sector receives investment and how these countries are moving in sustainable development. South America countries enhance sustainable development between 2008 to 2019. However, each country has a better score in one dimension than in other. We find that countries with more foreign investment in the natural resources have a greater economic and social performance than in the environmental dimension. With the exception of Bolivia that manage to improve the environmental score as much as the economic and social dimensions. Moreover, countries with more foreign investment in service sector has better social and economic scores. Lastly, the unique case of Brazil shows that foreign investment concentrated in the manufactured sector have an incredible great performance in social dimension, followed by economic and environmental dimensions. Therefore, we conclude that sustainable development progress is differently for each country because different industries and sectors receives foreign investment.

These conclusions are relevant to create policies and strategies to achieve the 2030 Agenda. These results drive relevant focus to which dimension governments, local entities, and international organizations should paid attention to encourage sustainable development in South America. Moreover, it is the government's responsibility to implement conditions to attract FDI always keeping in mid the three dimensions of sustainable development. Strategies to encourage FDI that brings new technology is a key for three dimensions.

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Appendix A

SDG	Code	Indicator	Harmful SDG
2	Indicador2.1	Cereal yield (kg per hectare)	No
2	Indicador2.2	Prevalence of anemia among women of reproductive age (% of women ages 15-49)	Yes
3	Indicador3.4	Adolescent fertility rate (births per 1,000 women ages 15-19)	Yes
3	Indicador3.5	Immunization, DPT (% of children ages 12-23 months)	No
3	Indicador3.6	Immunization, HepB3 (% of one-year-old children)	No
3	Indicador3.7	Immunization, measles (% of children ages 12-23 months)	No
3	Indicador3.8	Incidence of HIV, ages 15-49 (per 1,000 uninfected population ages 15-49)	Yes
3	Indicador3.9	Incidence of tuberculosis (per 100,000 people)	Yes
3	Indicador3.10	Mortality caused by road traffic injury (per 100,000 population)	Yes
3	Indicador3.11	Mortality from CVD, cancer, diabetes or CRD between exact ages 30 and 70 (%)	Yes
3	Indicador3.12	Mortality from CVD, cancer, diabetes or CRD between exact ages 30 and 70, female (%)	Yes
3	Indicador3.13	Mortality from CVD, cancer, diabetes or CRD between exact ages 30 and 70, male (%)	Yes
3	Indicador3.14	Mortality rate attributed to unintentional poisoning (per 100,000 population)	Yes
3	Indicador3.16	Mortality rate attributed to unintentional poisoning, male (per 100,000 male population)	Yes
3	Indicador3.17	Mortality rate, neonatal (per 1,000 live births)	Yes
3	Indicador3.18	Mortality rate, under-5 (per 1,000 live births)	Yes

3	Indicador3.19	Mortality rate, under-5, female (per 1,000 live births)	Yes
3	Indicador3.20	Mortality rate, under-5, male (per 1,000 live births)	Yes
3	Indicador3.22	Suicide mortality rate (per 100,000 population)	Yes
3	Indicador3.23	Suicide mortality rate, female (per 100,000 female population)	Yes
3	Indicador3.24	Suicide mortality rate, male (per 100,000 male population)	Yes
5	Indicador5.28	Contributing family workers, female (% of female employment) (modeled ILO estimate)	Yes
5	Indicador5.29	Contributing family workers, male (% of male employment) (modeled ILO estimate)	Yes
6	Indicador6.37	People practicing open defecation, urban (% of urban population)	Yes
6	Indicador6.38	People using at least basic drinking water services, urban (% of urban population)	No
6	Indicador6.39	People using at least basic sanitation services, urban (% of urban population)	No
6	Indicador6.40	Renewable internal freshwater resources per capita (cubic meters)	No
6	Indicador6.42	Water productivity, total (constant 2015 US\$ GDP per cubic meter of total freshwater withdrawal)	No
7	Indicador7.44	Access to electricity (% of population)	No
7	Indicador7.45	Access to electricity, rural (% of rural population)	No
7	Indicador7.46	Access to electricity, urban (% of urban population)	No
7	Indicador7.47	Renewable energy consumption (% of total final energy consumption)	No
8	Indicador8.48	Agriculture, forestry, and fishing, value added per worker (constant 2015 US\$)	No
8	Indicador8.49	Commercial bank branches (per 100,000 adults)	No

8	Indicador8.50	Employment in agriculture (% of total employment) (modeled ILO estimate)	No
8	Indicador8.51	Employment in agriculture, female (% of female employment) (modeled ILO estimate)	No
8	Indicador8.52	Employment in agriculture, male (% of male employment) (modeled ILO estimate)	No
8	Indicador8.53	Employment in industry (% of total employment) (modeled ILO estimate)	No
8	Indicador8.54	Employment in industry, female (% of female employment) (modeled ILO estimate)	No
8	Indicador8.55	Employment in industry, male (% of male employment) (modeled ILO estimate)	No
8	Indicador8.56	Employment in services (% of total employment) (modeled ILO estimate)	No
8	Indicador8.57	Employment in services, female (% of female employment) (modeled ILO estimate)	No
8	Indicador8.58	Employment in services, male (% of male employment) (modeled ILO estimate)	No
8	Indicador8.59	Energy intensity level of primary energy (MJ/\$2017 PPP GDP)	Yes
8	Indicador8.60	GDP growth (annual %)	No
8	Indicador8.61	GDP per capita growth (annual %)	No
8	Indicador8.62	GDP per person employed (constant 2017 PPP \$)	No
8	Indicador8.63	Industry (including construction), value added per worker (constant 2015 US\$)	No
8	Indicador8.64	Services, value added per worker (constant 2015 US\$)	No
8	Indicador8.65	Unemployment, female (% of female labor force) (modeled ILO estimate)	Yes
8	Indicador8.66	Unemployment, male (% of male labor force) (modeled ILO estimate)	Yes

8	Indicador8.67	Unemployment, total (% of total labor force) (modeled ILO estimate)	Yes
8	Indicador8.68	Unemployment, youth female (% of female labor force ages 15-24) (modeled ILO estimate)	Yes
8	Indicador8.69	Unemployment, youth male (% of male labor force ages 15-24) (modeled ILO estimate)	Yes
8	Indicador8.70	Unemployment, youth total (% of total labor force ages 15-24) (modeled ILO estimate)	Yes
8	Indicador8.71	Wage and salaried workers, female (% of female employment) (modeled ILO estimate)	No
8	Indicador8.72	Wage and salaried workers, male (% of male employment) (modeled ILO estimate)	No
8	Indicador8.73	Wage and salaried workers, total (% of total employment) (modeled ILO estimate)	No
9	Indicador9.74	CO2 emissions (kg per 2015 US\$ of GDP)	Yes
9	Indicador9.76	CO2 emissions (kg per PPP \$ of GDP)	Yes
9	Indicador9.77	CO2 emissions (metric tons per capita)	Yes
9	Indicador9.78	Individuals using the Internet (% of population)	No
9	Indicador9.79	Manufacturing, value added (% of GDP)	No
9	Indicador9.80	Manufacturing, value added (current US\$)	No
9	Indicador9.81	Medium and high-tech manufacturing value added (% manufacturing value added)	No
11	Indicador11.8 2	Urban population	No
11	Indicador11.8 3	Urban population (% of total population)	No
11	Indicador11.8 4	Urban population growth (annual %)	No
12	Indicador12.8 5	Adjusted net savings, excluding particulate emission damage (% of GNI)	No

12	Indicador12.8 7	Forest rents (% of GDP)	No
12	Indicador12.9 1	Total natural resources rents (% of GDP)	No
14	Indicador14.9 2	Aquaculture production (metric tons)	No
14	Indicador14.9 3	Capture fisheries production (metric tons)	No
14	Indicador14.9 4	Total fisheries production (metric tons)	No
15	Indicador15.9 5	Forest area (% of land area)	No
15	Indicador15.9 6	Forest area (sq. km)	No
17	Indicador17.9 8	Exports of goods and services (% of GDP)	No
17	Indicador17.9 9	Foreign direct investment, net inflows (% of GDP)	No
17	Indicador17.1 01	GDP (constant 2015 US\$)	No
17	Indicador17.1 02	GDP (constant LCU)	No
17	Indicador17.1 03	GDP (current LCU)	No
17	Indicador17.1 04	GDP (current US\$)	No
17	Indicador17.1 05	GDP per capita (constant 2015 US\$)	No
17	Indicador17.1 06	GDP per capita (constant LCU)	No
17	Indicador17.1 07	GDP per capita (current LCU)	No

17	Indicador17.1 08	GDP per capita (current US\$)	No
17	Indicador17.1 09	GDP per capita, PPP (constant 2017 international \$)	No
17	Indicador17.1 10	GDP per capita, PPP (current international \$)	No
17	Indicador17.1 11	GDP, PPP (constant 2017 international \$)	No
17	Indicador17.1 12	GDP, PPP (current international \$)	No
17	Indicador17.1 13	GNI (constant 2015 US\$)	No
17	Indicador17.1 14	GNI (constant LCU)	No
17	Indicador17.1 15	GNI per capita (constant 2015 US\$)	No
17	Indicador17.1 16	GNI per capita (constant LCU)	No
17	Indicador17.1 17	GNI per capita (current LCU)	No
17	Indicador17.1 18	GNI per capita growth (annual %)	No
17	Indicador17.1 19	GNI per capita, Atlas method (current US\$)	No
17	Indicador17.1 20	GNI per capita, PPP (constant 2017 international \$)	No
17	Indicador17.1 21	GNI per capita, PPP (current international \$)	No
17	Indicador17.1 22	GNI, PPP (constant 2017 international \$)	No
17	Indicador17.1 23	GNI, PPP (current international \$)	No

17	Indicador17.1 24	Methodology assessment of statistical capacity (scale 0 - 100)	No
17	Indicador17.1 25	Periodicity and timeliness assessment of statistical capacity (scale 0 - 100)	No
17	Indicador17.1 26	Personal remittances, received (% of GDP)	No
17	Indicador17.1 28	Source data assessment of statistical capacity (scale 0 - 100)	No
17	Indicador17.1 29	Statistical Capacity Score (Overall Average) (scale 0 - 100)	No

Appendix B

Economic Dimension

	Coef.
Chi-square test value	15.409
P-value	.004

Social Dimension

	Coef.
Chi-square test value	1.99
P-value	.738

Environmental Dimension

	Coef.
Chi-square test value	.807
P-value	.938